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A Lasting Model for Change: How the Lean Startup Was Born

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In this short essay, Steve Blank describes his personal experiences and his role in founding the Lean Startup movement.

Keywords: *Careers; MICRO; Change Management; Organizational Design and Change; Organizational design; change; and interventions*

Revolutions start by overturning the status quo. By the end of the 20th century, case studies, business plans, and conventional wisdom on early stage–startup methodologies had reached an evolutionary dead end for entrepreneurs. Here's why, and what we did about it.

When I wrote *The Four Steps to the Epiphany* (Blank, 2003), over 2 decades ago, I had no idea I would be starting the Lean Startup revolution. Newly retired, with time to reflect on what I had learned from my eight startups and 21 years as an entrepreneur, I was struggling to reconcile the reality of my experience with the then common advice about how to start a company. Alone in a ski cabin with the snow coming down outside, and my wife and daughters out on the slopes all day, I started collecting my thoughts by writing a series of "lessons learned" stories that I had hoped would become my memoirs.

Eighty some pages later I realized that (a) I had some great war stories as a good marketeer and CEO, (b) I'd have to pay my wife and kids to read them, (c) the three of them were probably the entire available market, and (d) when I looked at what I had done and what other entrepreneurs had done at their startups, that there was a pattern.

I began to detect something deeper than I had ever seen before; there seemed to be a pattern in the midst of the chaos. Arguments that I had heard at my own startups seem to be repeated at others. The same issues arose time and again: big company management styles versus entrepreneurs wanting to shoot from the hip, founders versus professional managers, engineering versus marketing, marketing versus sales, missed schedule issues, sales missing

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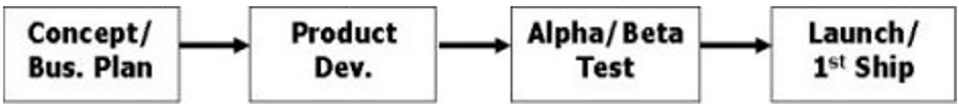
Figure 1
Product Development Diagram



the plan, running out of money, raising new money. After sitting on public and private boards, I enjoyed seeing other startups from an outsider's perspective. I began to gain an appreciation of how world-class venture capitalists develop pattern recognition for these common types of problems. "Oh yes, Company X, they're having problem number 43. Here are the six likely ways that it will resolve, with these probabilities." No one was actually quite that good, but some VCs had "golden guts" for these kinds of operating issues.

Something about this bothered me in the back of my mind. If great venture capitalists could recognize and sometimes predict the types of problems that were occurring, didn't that mean that the problems were common across startups, not just management screwups in individual startups? Wasn't something fundamentally wrong with the way everyone organizes and manages startups? Wasn't it possible that the problems in every startup were somehow self-inflicted and could be ameliorated with a different structure? Yet, when I talked to my venture capital friends, they said, "Well, that's just how startups work. We've managed startups like this forever; there is no other way to manage them."

It dawned on me that the pattern I was seeing was that investors, venture capitalists, and educators were all teaching entrepreneurs to use the same processes used in an established company. To be successful, you wrote a plan, raised money, and then executed to the plan, all in a very linear direction—just like launching a product inside a successful corporation.

My experience suggested that they were all wrong.

I started by asking: What is it that makes some startups successful and leaves others selling off their furniture? It occurred to me that startups were not smaller versions of large companies. Yet, the processes that early-stage companies were using were identical to that of large corporations. Every startup bringing a new product to market used some form of the Product Development Model shown in Figure 1. We now realize that it was one the causes of early startup failure. The product-centric model described a process that evolved in manufacturing industries. It was adopted by the consumer-packaged goods industry in the 1950s and spread to the technology business in the last quarter of the 20th century. It had become an integral part of startup culture.

At first glance, the diagram, which illustrates the process of getting a new product into the hands of waiting customers, appears helpful and benign. The model is a good fit when launching a new product into an existing, well-defined market, where the basis of competition is understood, and its customers are known.

But few startups fit these criteria. Few had a clue what their market was when they first started. Yet, the product development model was used in startups not only to manage product development, but as a road map for finding customers, timing the marketing launch, and forecasting sales revenue. The model became a catchall tool for all schedules, plans, and budgets. Investors used the product development diagram in board meetings to see if startups were "on plan" and "on schedule."

The reality was that everyone—investors, CEOs, their management team—was using a road map that was designed for a very different location, and they were surprised when they ended up lost.

When I looked at the diagram in that ski cabin, I realized there was a fundamental question I couldn't answer: If all startups follow that model, why is it that some companies are opening bottles of champagne at their IPO while others who followed the same rules are selling off their furniture? What was the difference here? Were all startups the same? Were startups failing because of product failures, or was there some other failure mode? Is there any way to predict success or failure? And, more importantly, was there any way to reduce risk in early-stage ventures?

That day, alone in the cabin, I knew I had to find the answer.

Looking at the pattern of startups that survived their first few tough years, it occurred to me that they did not follow the traditional product-centric launch model espoused by product managers or the venture capital community. These successful startup survivors, through trial and error, hiring and firing, all had independently invented a parallel process to product development. In particular, the winners invented and lived by a process of customer learning, discovery, and iterative product development. It was a process that did not exist in large companies, which had existing customers, known markets, and established distribution channels.

I realized that founders of new ventures lacked an accurate definition of what a startup was, and that lack of clarity was hindering their ability to manage their new venture. Once I defined a startup as "a temporary organization, designed to search for a repeatable and scalable business model" the role of the founding CEO became clearer: Their job was to search for that repeatable and scalable business model.

And how they searched for a business model started with the unique observation that "all you have on day one is a series of untested hypotheses about your business model." This statement expanded into the observation that "there are no facts inside the building, so get the heck outside." This was a unique and critical insight. In a large company, there are a series of knowns: known customers, known customer needs, known distribution channels, pricing, costs, etc. But a startup? A startup begins with a series of unknowns, yet entrepreneurs and their investors had fallen into the trap that once a business plan was funded the only job of the founding team was to execute the plan. Even in the 20th century, most investors would tell you that "no business plan survives first contact with customers"—but no one had clearly articulated the reason. In an existing corporation, a business plan more than likely contained facts and the team simply needed to execute the plan. But in a startup, a business plan just contained hypotheses, and the team needed to search for information to validate those hypotheses.

This search process did not have a language to formally describe it, nor was there a common toolset others could use to repeat it. Yet, it was life and death for a new venture. I called this process "Customer Development," a sibling to "Product Development." The "Customer Development" model was a paradox because it was followed by successful startups, yet at the time was articulated by no one. Its basic propositions were the antithesis of common wisdom, yet they were followed by those who succeeded. It was the path hidden in plain sight.

I spent several years formalizing the Customer Development process and the concepts of Market Types, Minimal Viable Products (MVPs), and the Pivot. While it seemed obvious to me that startups needed to build their own management toolsets for searching for a business

model, it was a pretty lonely couple of years convincing others. Over time, necessity—not investors, educators, or academics—drove adoption of the customer development process. The emerging Web, mobile, and cloud apps, which were being built with small teams using agile development, needed a much faster process to acquire customer feedback. This new generation of entrepreneurs were rapid early adopters of customer development. It helped them reduce the odds of failing—by getting them out of the building to get early customer feedback—as they built their product incrementally and iteratively. Simultaneously, venture capitalists recovering from the excesses of the Dotcom crash were looking for ways to more efficiently build startups and reduce their infant mortality.

After *The Four Steps to the Epiphany* was published, I began teaching the Customer Development process as a full-semester course at the University of California, Berkeley. A student in my first Berkeley class, Eric Ries, became the first practitioner and tireless evangelist of the process at his startup (IMVU), iterating and testing the process as I sat on his board. His insight coupled customer development to the emerging agile engineering practice, and together the two methodologies helped IMVU founders rapidly iterate their products, guided by customer feedback. From his experiences, Eric wrote *The Lean Startup* (Ries, 2011), which gave the movement its name and greatly expanded awareness.

Around the same time, Osterwalder and Pigneur (2010) introduced their business model canvas, which provided the customer development process with a much needed front end to organize all of a startup's hypotheses into a simple framework that serves as a baseline and a scorecard for teams as they move through customer development.

These new ideas have coalesced into what has today become the Lean Startup movement. I was invited to teach at Stanford, where I turned the Lean Startup methodology into a series of new capstone classes: Lean LaunchPad, Hacking for Defense, and I-Corps. I-Corps has become the standard for commercializing scientific research in the United States. Variations of these classes are now taught in most major universities and in thousands of entrepreneurial programs around the world. Hundreds of books later, the core ideas of Lean are the canonical model of how startups are built. From its humble beginnings as the disjointed thoughts of a retired entrepreneur, who would've thought?

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The Creation Theory of Entrepreneurship and Lean Startup Frameworks: Complementary or Contradictory?

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The practitioner framework, the Lean Startup, largely based on the experience of Blank (2013), and developed separately from scholarly work, has none-the-less made inroads in the academic literature. In reconciling The Lean Startup framework with entrepreneurship theory, Blank and Eckhardt argue that theory work in entrepreneurship is fragmented. However, this paper argues that these theories may not be as fragmented as implied. Indeed, many theories in entrepreneurship can be grouped into two "families"—one of which is broadly consistent with the model in The Lean Startup, while the other is deeply inconsistent with this model but consistent with an important theory in entrepreneurship: the Creation Theory of Entrepreneurial Opportunities. What this paper shows is that there are important differences that lead to boundary conditions between these two families of theory. More profound, these different approaches to the entrepreneurship process suggest they should be applied in different entrepreneurial settings and at different points in the process. This paper examines the link between the Creation Theory of Entrepreneurship and its associated family of theories and the Lean Startup framework and its associated family of theories, such as Discovery, IO Nexus, The Scientific Method, and so forth. The paper concludes by describing the different contexts under which each family of theories apply and suggests future research that empirically test the boundary conditions of these different theory families.

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Consumer demand for frameworks designed to help individuals become successful entrepreneurs appears to be unabated. If, for example, you type "Entrepreneurship Books" into Amazon's search engine, you will see a list of approximately 1,650 books, many of which present such "entrepreneurial success frameworks."

Although several of these books claim to be the "#1 entrepreneurship bestseller of all time," there is little doubt that one of the most influential of these books has been *The Lean Startup* (Ries, 2011), based on the *Lean Startup* method (Blank, 2013). Much of the work on the Lean Startup framework is based on the experience of Blank (2013; Blank & Euchner, 2018), and the framework emphasizes "validated learning," where would-be entrepreneurs learn how to build a sustainable business by using frequent experiments to test the veracity of each element of their vision (Blank, 2013; Ries, 2011). *The Lean Startup* methodology is touted as an extension of both the scientific method and "lean manufacturing" and is used in many academic classes on entrepreneurship.

While the *Lean Startup* methodology refers to the scientific method and lean manufacturing, the book does not directly refer to any currently influential theories in the scholarly field of entrepreneurship. Blank and Eckhardt (2023) attempt to remedy this problem by identifying the relationship between *The Lean Startup* framework and seven current theoretical conversations in the academic field of entrepreneurship. However, the success of this effort by Blank and Eckhardt (2023) is limited for a couple of reasons. First, their reviews of different theories in entrepreneurship are not in-depth or systematic, and thus the links between these different theories and *The Lean Startup* are not clear. Second, their view of theory in the field of entrepreneurship is that it is highly fragmented, divided into seven—and perhaps more—different theoretical perspectives in heated competition with each other.

One way to address the first limitation of Blank and Eckhardt (2023) would be to systematically review each of the theories they identify in-depth, and then explore how these theories do or do not link with the model in *The Lean Startup*. However, this seems like a task more suited for a book than a single article. So, rather than take on this broad task, this paper examines one theory identified by Blank and Eckhardt (2023)—creation theory (Alvarez & Barney, 2007)—in sufficient detail to identify its links with *The Lean Startup*.

This effort leads to an approach to addressing the second limitation of Blank and Eckhardt (2023) concerning the perceived fragmentation of theory in the field of entrepreneurship. While there are heated conflicts among different entrepreneurship theorists, theory in entrepreneurship may not be as fragmented as Blank and Eckhardt (2023) imply. Indeed, many of these theories can be grouped into two "families"—one of which is broadly consistent with the model in *The Lean Startup*, and the other which is deeply inconsistent with this model, the Creation Theory of Opportunities.[1] While each of these families of theory apply under different contexts and are differentiated by boundary conditions, taken together, these two families of theories may offer a more complete view of the entrepreneurship process than has previously been acknowledged.

Thus, the purposes of this paper are, first, to review the creation theory of opportunities and recent work, in order to do a more in-depth analysis about the link between creation theory[2] and the model in *The Lean Startup*; and second, to examine the relationship between this *Lean Startup* model and broader theoretical conversations in the field of entrepreneurship.

Creation Theory

Following the work of other theorists in the field of entrepreneurship (e.g., Shane, 2003; Shane & Venkataraman, 2000), Alvarez and Barney (2007) define opportunities as competitive imperfections in product or factor markets. What distinguishes creation theory from other popular entrepreneurship theories is the idea that these competitive imperfections are created, endogenously, by the iterative and path-dependent actions of individuals. When this is the case, opportunities do not exist as objective phenomena just waiting to be discovered by unusually alert individuals (Shane, 2003), rather creation opportunities are socially constructed by individuals whose actions may form these opportunities.

These socially constructed opportunities do not exist independent of an individual's perceptions and actions and, thus, cannot be studied—or measured, for that matter—as if they are out there waiting to be discovered.

In this view there is no "end" until the creation process has unfolded, thus, opportunities in this view cannot be understood until they exist, and they only exist after they are enacted in an iterative process of action and reaction. (Alvarez & Barney, 2007: 15)

The following sections discuss entrepreneurs, the decision-making context, and the process of creation. These sections are followed by two sections on the social ontology and conversational experiments that incorporate more recent work on creation theory.

Creation Entrepreneurs

Theories consistent with *The Lean Startup* framework about the formation and exploitation of opportunities assume that entrepreneurs differ from non-entrepreneurs in ways that make the former more alert to opportunities than the latter (Blank & Eckhardt, 2023; Shane, 2003). Despite a great deal of research designed to identify these critical differences, there is still relatively little systematic work that demonstrates how these two groups of individuals differ ex ante to the process (Eckhardt & Shane, 2003). Even when differences have been identified, it remains unclear whether or not they are the cause of entrepreneurship or the effect of entrepreneurship (Alvarez & Barney, 2007).

Creation theory is agnostic about these kinds of ex ante differences—they may or may not exist, and if they do exist, they may or may not make some people more alert than others to entrepreneurial opportunities. Instead, creation theory focuses less on ex ante differences between entrepreneurs and non-entrepreneurs, and more on how the process of creating an opportunity can affect the people who go through this process (Nonaka, Toyama, & Nagata, 2000). Thus, for example, while there is strong empirical evidence that entrepreneurs manifest certain cognitive biases—including the representativeness bias and the overconfidence bias (Busenitz & Barney, 1997)—to a greater degree than non-entrepreneurs, it is still unclear if individuals who manifest these cognitive biases are naturally drawn to entrepreneurship, or

if the process of creating opportunities reinforces and strengthens the cognitive biases that everyone already has, or both (Hecker, Dutke, & Sedek, 2000).

Indeed, it may be the case that two individuals might be virtually indistinguishable with respect to their personality, their cognitive abilities, their social position, and so forth, ex ante. However, even small differences in their local environments—who an individual happens to know, where they happen to live—and their personal attributes—small cognitive differences, small personality differences—can evolve into larger differences, ex post, through the process of creating an opportunity. Thus, large ex post differences between entrepreneurs and non-entrepreneurs—in cognitive biases, attitudes toward risk, and so forth—do not necessarily imply that these same differences existed, ex ante, or that such differences are the explanation of why some people and not others become entrepreneurs (Alvarez & Barney, 2007, 2013; Alvarez & Sachs, 2023; Hayward, Shepherd, & Griffin, 2006).

Creation Decision-Making Context

If individuals create opportunities that they end up exploiting, then it follows that the decision-making context in which this process unfolds is uncertain. Since opportunities do not exist until they are created, at the point a decision about whether or not to engage in forming an opportunity is made, the information required to know the possible outcomes associated with this decision, and their probability, does not yet exist (Knight, 1921). The inability to estimate the probability distributions associated with making decisions in this setting does not depend on the limited time that potential entrepreneurs have had to collect information about a new opportunity, nor on the ability of potential entrepreneurs to analyze the information they have collected. In conditions of uncertainty, even entrepreneurs with a great deal of time, or with unusual analytical abilities, will not be able to estimate the relevant probability distributions of their actions (Knight, 1921).

This does not mean that entrepreneurs operating in creation settings will be unable to collect at least some information, ex ante, about certain courses of action. Thus, for example, experimenting is not impossible in the opportunity formation process, but the experiments are conversational experiments where individuals interact with each other to understand and give meaning to the new innovation that is emerging (Alvarez & Sachs, 2023). The purpose of conversational experiments in this uncertain setting is not to ascertain the "actual" or "objective" properties of an opportunity, but, rather, to test whether the language an individual uses to describe a possible opportunity can be understood and appreciated by other individuals, including potential employees and customers.

The entrepreneur in creation theory does not efficiently search an exogenously given and fixed "landscape" to avoid getting "stuck" on a "local optimum" in a risky context with incomplete information about the structure of a "landscape." Nor does creation theory assume, as does *Lean Startup*, that the main informational issue is information asymmetry (customers know something that entrepreneurs do not know, or entrepreneurs know something customers do not know).

Rather, creation theory supposes the possibility that entrepreneurs and others jointly interact to endogenously create the landscape within which they are operating. The creation view assumes the main information problem is symmetric Knightian uncertainty (neither entrepreneurs or what, ex post, turn out to be their potential customers, understand what an opportunity

is). In creation settings, entrepreneurial choices can change the landscape and, thus, for example, may take what was at one time a "local minimum" and turn it into a "global maximum."

This creation process is path dependent, in that small differences in initial decisions and choices made by humans can lead to large differences over time (Arthur, 1989). This path has chasms, discontinuities, and a higher rate of independence between steps. Uncertainty is interwoven with the path, and being on one step in the path does not mean you can see the next step or have enough predetermined knowledge of how to see the next step since the knowledge to make the next step may not exist.[3]

The Opportunity Creation Process

The process by which opportunities are formed in creation theory is evolutionary in nature (Campbell, 1960; Nelson & Winter, 1982; Weick, 1979).[4] Evolutionary processes have three critical elements: variation, selection, and retention.

In creation theory, actors are assumed to have intuitions or "guesses" (rational but subconscious; Metcalfe & Wiebe, 1987; Simon, 1987), or pursue epistemic curiosities (rational and conscious; Arikan, Arikan, & Koparan, 2020) about what might be an entrepreneurial innovation, and act accordingly. This is a source of variation in the evolutionary process. Markets that may not exist may also be formed at this time as individuals respond to those curiosities, intuitions, or "guesses," either positively or negatively.[5] This is the selection process. Finally, entrepreneurs respond by revising their beliefs about the nature of an opportunity or choosing to disengage in the opportunity formation process. Entrepreneurs who revise their beliefs and continue creating an opportunity are how retention occurs in creation theory (Newell & Simon, 1972; Nonaka & Takeuchi, 1995).

While the opportunity creation process is evolutionary in nature, the fact that this process unfolds under conditions of Knightian uncertainty has an important impact on this process. For example, under uncertainty, individual curiosities, intuitions, or "guesses" about what might turn into an opportunity are typically not well-informed and may be quite random. It is possible to describe these curiosities, intuitions, or "guesses" as theories (Zellweger & Zenger, 2023), but if they are theories, they are highly underdeveloped—at least in the earliest stages of the opportunity creation process.

Also, tests of these intuitions or "guesses" are conversational experiments that are fragmented, underdeveloped, and often generate deeply ambiguous understanding. As the process evolves, even when there may be a product or service, there may still be considerable ambiguity. For example, it may be the case that customers do not buy an entrepreneurial endeavor's products or services, but the reason why these purchases are not forthcoming may not be easy to know—is the product too big, or too small, or too fast, or too slow, or did potential customers just not know about the product?

Indeed, customers themselves may not fully understand why they are not purchasing new products or services. In this setting, asking potential customers why they did not buy or like a product or service may not be helpful. More fundamentally, identifying a sample of potential customers to ask about the potential of a product or service assumes that entrepreneurs know who their potential customers will be. Entrepreneurs may have a "hunch" about who those customers are, only to discover that—after an opportunity has become more fully formed—their actual customers are different from what they had anticipated (Alvarez, Young, & Wooley, 2015).

We also know, from both theory and practice (Christensen, 1997), that customers can lead a venture to engage in less innovative, less creative investments. When this is the case, trying to identify a new innovative product by asking a customer can be very problematic. As Steve Jobs said "You can't just ask customers what they want and try to give them that. By the time you get it built, they'll want something new" (Isaacson, 2011: 143).

Finally, because this evolutionary process unfolds under conditions of uncertainty, entrepreneurs engaging in opportunity creation will often fail to develop valuable opportunities. Indeed, it is likely that most efforts to create opportunities fail. However, this must logically be the case, because any model that "guaranteed" the creation of an opportunity would violate the rules for riches constraint in economics (Alvarez, Barney, & Anderson, 2013). That constraint is: Any process that will certainly create wealth will only create wealth for the person selling that process. In creation theory, entrepreneurs, and those with whom they interact, shape the context.

The Social Ontology of Creation Opportunities

An ongoing debate in entrepreneurship is whether opportunities are objective or subjective (Alvarez & Barney, 2010). Objective opportunities exist independent of human thought; subjective opportunities exist because of human thought (McBride & Wuebker, 2022). Without asserting that all opportunities are or are not subjective,[6] it is clear that creation theory assumes that opportunities formed by the iterative and path dependent process described here are—at their core—subjective in nature. They exist to the extent that entrepreneurs—and others associated with an entrepreneurial venture—have socially constructed them. As Nonaka, Von Krogh, and Voelpel (2006: 1181-1182) have observed, knowledge—including knowledge about opportunities—is "never free from human values and ideas, is embodied in an individual and is historically dependent, context specific and about problem definition rather than problem depiction and problem solving."

That opportunities are often subjective in nature does not mean that they cannot be studied. Indeed, to the extent that an entrepreneur is able to build a consensus among others that are engaged in the creation process about the value associated with an opportunity, it is possible to study a subjective opportunity as if it was objective. In this sense, entrepreneurship under conditions of uncertainty can be thought of as a process of developing a common belief about the positive value of an opportunity, even if that opportunity is deeply subjective in nature (Nonaka & Takeuchi, 1995; Pinker, 2018). As critical stakeholders come to believe in the value of such an opportunity, they can act on it as if it was objective.

However, that the opportunities discussed here are subjective in nature does not mean that they are not subject to external, sometimes seemingly objective, market and related forces. On April 23, 1985, the Coca-Cola Company introduced what they called the New Coke, a reformulated Coca-Cola. New Coke had been market tested for taste and was preferred by nearly 200,000 customers. By June of 1985, the Coca-Cola consumer hotline was receiving 1500 calls a day complaining about the New Coke. New Coke has been considered one of the biggest market failures ever (https://www.cocacolacompany.com/aboutus/history/new-coke-the-most-memorable-marketing-blunder-ever). So too, can entrepreneurs and those closely associated with an entrepreneurial endeavor firmly believe that the opportunity they are creating will generate real value—only to discover that other individuals in the market disagree.

The creation view assumes that demand for products and services and their markets are themselves social institutions and depend on humans to create these institutions while convincing others to be a part of a new future that may become institutionalized (Alvarez et al., 2015). While the market is socially subjective, the strengths of the beliefs of the market can seem as objective as a brick wall.

Conversational Experiments in the Opportunity Creation Process

Before an opportunity is created or even articulated, individuals have conversations about things that might be new or different within a context. Individuals in the creation process think, speak, act, respond, and react in a manner that might not have been predicted, perhaps even moments before they acted (Alvarez & Sachs, 2023). The notion of blind variation in the creation process emphasizes changes in unforeseen and perhaps even unwanted ways that might simply have been stimulated by cognitive processes of curiosity, creativity, imagination, and judgment (Arikan et al., 2020; Campbell, 1960). Thought, knowledge, and language are profoundly connected and evolve and can occur without any self-conscious planning or foresight (Sapir, 1944). These variations manifest themselves as conversational experiments posited by theory in the field of linguistics (Clark, 1996, 1998; Clark & Schaefer, 1989).

The creation of knowledge is a continuous process in which individuals overcome boundaries and constraints imposed by information and history and often requires an individual to view the world through a different lens (Nonaka et al., 2006). Individual understanding about a subject is based on the human ability to cognitively integrate various different subjective aspects from their context, the ability to differentiate among different dimensions of an issue, and the capacity to integrate the various aspects together (Conway, Suedfeld, & Tetlock, 2018), and is both conscience and unconscious. Beliefs themselves can be unconscious if an individual is unaware of that belief. Both the conscience and unconscious nature of beliefs and knowledge are passed on through language, a window into cognition (Pinker, 2018).

In the creation view, knowledge is transformative and a recombination of what might have seemed like disparate and unrelated knowledge, and allows for deviation from existing patterns of actions within a particular situation through the imagination of new possibilities (Arikan et al., 2020). Creativity and imagination in cognition are not an individual sport, they benefit from communication with many others (Pinker, 2018), making conversational experiments essential to the creation process.

Conversational experiments can focus on something that has not yet been created, that may be new to everyone involved and, perhaps, new to the world. Conversational experiments are how individuals articulate and give expression to what they are feeling or observing. As conversations begin and continue to evolve, they articulate the evolving variations in beliefs, knowledge, values, and—ultimately—can lead to the development of new language to describe an opportunity that accumulates over time, a language that had not previously existed. As people continue to interact and new language begins to emerge, they may become emotionally attached to these new ideas (Alvarez & Sachs, 2023). It is these attachments to the idea, and to each other, that guides subsequent actions of those associated with what may potentially be an opportunity (Alvarez & Sachs, 2023; Clark, 1998; Schleiermacher, 1998; Weick, 1995).

However, often, in this language building process, individuals learn that their original beliefs about the nature and scope of what they thought was interesting, was not that

interesting. Indeed, after several iterative actions, evaluations, and reactions, individuals may decide they have something potentially new to the world, or then again, they may go back several sequences to start again or even abandon the entire conversation altogether (Alvarez & Barney, 2007; Alvarez & Sachs, 2023; Cyert & March, 1963; March & Simon, 1958). This can lead to the abandonment of an idea or possible opportunity, and whatever new language was being used to discuss the idea or opportunity may go dormant.

Thus, the evolution of the opportunity creation process critically depends on the evolution of language to talk about the meaning and implications of that opportunity for those associated with its formation—for entrepreneurs, their potential partners, and their possible customers. As consensus about this language emerges among these stakeholders, an opportunity becomes more socialized (Berger & Luckmann, 1967), and the likelihood that it will lead to real failures in factor or product markets increases as the entrepreneur shapes the new context (Alvarez et al., 2015).

Creation Theory and *The Lean Startup* Method

This robust summary of creation theory suggests that while there may be some overlaps between creation theory and the assumptions of *The Lean Startup* method, these two ways of thinking about entrepreneurship are, at their core, fundamentally different.

On the side of overlap, both creation theory and *The Lean Startup* method suggest the importance of experimenting with new ideas, to understand their potential—economic and social. However, even here, the differences between these two approaches are manifest: Creation theory suggests that entrepreneurs can use conversational experiments to help create meaning and understanding of emerging opportunities that are endogenously formed (Alvarez & Sachs, 2023; Shelef, Wuebker, & Barney, 2023), while *The Lean Startup* approach seems to suggest that the primary use of experiments is to reveal existing information asymmetries about opportunities that exist independent of individuals (Blank & Eckhardt, 2023).

In creation theory, conversational experiments enable an individual's use of prescriptive language to pass on knowledge and communicate thoughts, represent ideas, make sense of the world, and talk about shaping an unknown future. Humans use conversation with others not just to understand their context but also to imagine how the context could be in the future. The enactment process of opportunity creation may lead to the formation of opportunities that require the development of fundamentally new knowledge and language to give meaning to an opportunity that did not exist prior to the formation process (Alvarez & Sachs, 2023). The individuals engaged in the process change their context, but they themselves are often fundamentally changed by the process and the language they have spoken.

The most fundamental differences between creation theory and *The Lean Startup* approach seem to be assumptions about where opportunities come from. For creation theory, opportunities are endogenous to entrepreneurial action; in *The Lean Startup*, they are exogenously created. In creation theory, entrepreneurs operate under conditions of uncertainty; in *The Lean Startup*, they operate under conditions of risk.[7,8] The informational problem facing entrepreneurs in creation theory is that information about an opportunity does not exist, ex ante. The informational problem facing entrepreneurs in *The Lean Startup* is that information about opportunities exist, but entrepreneurs do not yet have this information.

These, and other differences between creation theory and *The Lean Startup* method are fairly obvious; however, these differences suggest that these two approaches to understanding entrepreneurship may be complements, rather than competing substitutes, and may apply during different stages of the entrepreneurial process. Creation theory focuses on the very earliest stages of the opportunity formation process and as novel products and services that often require the education of customers are developed (Gladwell, 2009). While *Lean Startup* opportunities, by definition, are far enough developed and of a smaller scale to have objective, testable information, most are commonly found in add-on products and services where there is sufficient information to specify a hypothesis.

In the creation process, over time, as those associated with a potential opportunity develop a common language and test the fruitfulness of this language with others, the decision context of entrepreneurship begins to morph. It shifts from almost entirely Knightian uncertainty, to a setting where at least some decisions are risky in nature. As an opportunity evolves in this way—that is, as it becomes more risky and less uncertain—then many of the tools and methods of *The Lean Startup* seem more likely to be applicable. While Knightian uncertainty never fully disappears, it can nevertheless be the case that endogenously created opportunities can evolve to the point that they can be treated as if they are objective, and collecting data from possible customers can be useful in exploiting such an opportunity. Put differently, the creation process can endogenously form opportunities that when they reach a certain point of development, they may be seen as exogenous from the point of view of those applying *The Lean Startup* method.

Of course, it can sometimes be difficult to know if an opportunity has evolved to the point where it can be evaluated using *The Lean Startup* methods. Creation theory suggests several possible indicators of this change in the nature of an opportunity—for example, when a new language has been created and implemented for describing an opportunity, it may be possible to use *The Lean Startup* methods for evaluating that opportunity.

The Structure of Entrepreneurship Theory

As has already been suggested, Blank and Eckhardt (2023) characterize the theoretical landscape in entrepreneurship as highly fragmented—with seven, or more, theories of entrepreneurship competing with each other. The idea that creation theory and *The Lean Startup* method may be complements but not substitutes suggests a different way of thinking about the current state of entrepreneurship theory. Indeed, it may be possible to group many of the apparently "competing" theories of entrepreneurship into two complementary "families" of theory (Table 1).[9]

Type One Entrepreneurship Theories

The first family of theories—call it Type One Entrepreneurship Theories—focuses on the earliest stages of entrepreneurial action. Type One Theories—including creation theory, bricolage (Baker & Nelson, 2005), and effectuation (Sarasvathy, 2001)—focus on decision-making under Knightian uncertainty. They tend to focus on how cognitive biases inform and enable decision-making in these settings, and how random events can affect the evolution of entrepreneurial endeavors. For example, in the creation theory of opportunity formation, agents are cognitively biased. These biases help individuals think about events, contexts, and

Table 1
Type I and Type II Theories of Entrepreneurship

Dimensions	Type 1	Type 2
Emergence of thought	Endogenous	Exogenous
Entrepreneurial opportunity with profit potential	Created	Discovered
Lifecyle of entrepreneurship	Early phase of emergence	Later phase of venturing
Behavioral tenants	Effectuation, bricolage, enactment, information sharing, leaning by doing	Information asymmetry, learning races, herding, contagion, learning existing knowledge
Cognitive processes	Stimulus-independent *rational but subconscious processes* like intuition, "guesses," biases, and generative cognitive cognition (e.g., dreaming and imagination) or Stimulus-independent *rational but conscious processes* like epistemic curiosity, generative cognitive cognition (e.g., mental simulation, mind-wandering).	Stimulus dependent alertness, awareness, pattern matching, problem identification and solving methods, efficiency in learning and application
Decision-making mode	Non-codifiable subjective certainty and judgment under uncertainty Consistent with assumptions of Knightian Uncertainty	Codifiable objective decision making and optimization under risk Consistent with assumptions risk
Coalition building	Process-based new language generation by conversational experimentation adhering to descriptive and analogical insights, idiosyncrasies hindering replicability (e.g., open-system with undetermined boundary conditions)	Evidence-based communication adhering to (quasi) scientific experimentation outcomes and results, replicability (e.g., closed-system with boundary conditions)
Theories in the Same family	Creation Theory, Bricolage, and Effectuation	Discovery Theory, Lean Start-up, Scientific Method

so forth, in a different manner than others in the population. Cognitive biases and generative cognition, creativity, curiosity, judgement, and imagination assist individuals making decisions when there is a lack of information and knowledge, when the information is complex, or competing information needs to be processed (Nordgren, Bos, & Dijksterhuis, 2011). Creation theory posits that cognition and cognitive biases are useful when the process requires an individual to consider multiple and uncertain alternatives as well as unknown means–end connections, and to integrate remotely associated cognitive material (Campbell, 1988; Miron-Spektor, Efrat-Treister, Rafaeli, & Schwarz-Cohen, 2011).

This family of theories acknowledges that conversational experiments such as interacting with potential stakeholders can be important in helping entrepreneurs to give meaning to and understand their emerging opportunities, but they also recognize that entrepreneurs' assumptions about who their potential customers are, and what questions they should ask, can be deeply wrong. Finally, they also recognize that not only can opportunities be endogenously created, but that the context within which an entrepreneurial endeavor competes is also socially constructed. In other words, these entrepreneurs shape their contexts.

None of these Type One Theories provide an algorithm or framework that individuals can use to create and exploit opportunities. But this does not mean that these theories do not have important implications for practicing entrepreneurs. Indeed, the pitching of ideas is a way to have conversational experiments that are geared primarily at understanding the idea. Sarasvathy's (2001) "five principles" of effectuation provide a framework for teaching and practice that is broadly consistent with both bricolage theory and creation theory as it has been reviewed here. Similar to *The Lean Startup* that provides a framework for certain entrepreneurship theories, Effectuations' Five Principles and the pitching of ideas can provide a framework for theories consistent with creation theory.

Of course, none of this suggests that there are not important differences among different Type One Entrepreneurship Theories; it only suggests that these theories actually have much in common and, in particular, are fundamentally different from Type Two Entrepreneurship Theories.

Type Two Entrepreneurship Theories

The second family of theories—Type Two Entrepreneurship Theories—focuses on later stages of entrepreneurial action where information is sufficient to build experiments, such as add-on products and services. Type Two Theories—including *The Lean Startup* method, discovery theory (Shane, 2003), and recent applications of the scientific method to entrepreneurship (Zellweger & Zenger, 2023)—characterize the entrepreneurial process as unfolding under conditions of risk, where actors use experiments to search for information and eliminate information asymmetries that help them to exploit opportunities that are objective, in the sense that they exist independent of human perception.

The first assumption of *The Lean Startup* and models consistent with this approach, is that information asymmetries between entrepreneurs and customers need to be reduced by the entrepreneurs through their actions to discover demand. The process *The Lean Startup* suggests using is "a quasi-scientific approach that emphasizes testable hypotheses and empirical data to generate knowledge regarding market feasibility" (Blank & Eckhard, 2023: 10). Experiments and application of the scientific method are important in most of these theories, for this is how entrepreneurs can come to understand the nature of the opportunities they seek to exploit; and, of course, both opportunities and the landscapes within which they are embedded are exogenously formed.

These theories also have important implications for entrepreneurs, especially for entrepreneurs operating under conditions of risk. Many of these implications are presented in *The Lean Startup*. In these Type Two Theories, an entrepreneur has a pre-existing theory. A formal theory is a set of principles upon which the practice of an activity is based and is falsifiable. A non-formal theory is an idea used to account for a situation or to justify a course of action. In these Type Two Theories a theory is no more than an idea, and this method does not account for how the idea came about in the first place. This notion of an idea, however, would have its origins in the myopic variations theorized in the creation process.

Research on applying the scientific method in entrepreneurial settings explicitly examines whether or not training entrepreneurs in these skills improves their economic outcomes.[10] However, in order to have a testable hypothesis as suggested in these theories, the researcher needs to have both an independent and dependent variable that is provable or disprovable; it

has to be reproducible, and require enough data gathered to draw a credible result. The information requirement of the Type Two Theories suggests that the types of opportunities considered are connected to abundant data and are likely to be well defined, perhaps limiting their wealth-creating potential.

Of course, none of this suggests that there are not important differences among different Type Two Entrepreneurship Theories. It only suggests that these theories actually have much in common and, in particular, that they are all different from Type One Entrepreneurship Theories.

Are These Theory Families Complements or Substitutes?

Based on the logic presented earlier on the relationship between creation theory and *The Lead Startup* method, it follows that it is likely to be more fruitful to think of Type One and Type Two Entrepreneurship Theories as complements, but not substitutes. They are clearly both theories of entrepreneurial action, but seem to apply in different settings. Creation Type One theories apply during the initial phase of the opportunity formation process and when developing novel products and services where customers need to be educated before the opportunity becomes viable (Alvarez et al., 2015). Type Two theories apply when there is sufficient data and product/service knowledge developed that experiments can be designed and tested. In this sense, it is probably unreasonable for theorists in one family or the other to claim to have "the" theory of entrepreneurship.

In the last 25 to 30 years, several authors, including but not limited to Alvarez and Barney (2007), Alvarez and Sachs (2023), Blank (2012), Eckhardt and Shane (2003), Sarasvathy (2001), Shane (2003), Venkataraman (1997), and so forth, have made significant theoretical contributions in the modern field of entrepreneurship. As these theories of entrepreneurship have become more specified, it becomes clear that they apply under different conditions of the entrepreneurial process. The important challenge going forward is to empirically test these different theories to better understand the boundary conditions of these theories. In other words, under what conditions do they apply and when they do not apply? After all, if a theory can explain everything, it is a theory of nothing.

Boundary conditions in theories are the set of conditions or constraints that indicate the edges of the theory and have to be specified for a theory to be valid (DiMaggio & Powell, 1983). Indeed, specifying boundary conditions is critical for a theory to be both understood and developed (Bacharach, 1989). Boundary conditions improve precision and are important to advance all theories and constitute the core foundation from which methods to explore the theory are used and developed (Gonzalez-Mulé & Aguinis, 2018).

Going forward, probably the most critical theoretical issue for the field is to spend time and energy identifying and empirically testing the boundary conditions that identify when these two theory families do and do not apply. The extreme cases are already reasonably clear: Type One theories apply in the early stages of entrepreneurship, where decision-making takes place under Knightian uncertainty, and so forth; Type Two theories apply in later stages of entrepreneurship, where decision-making takes place under conditions of risk, and so forth.

However, identifying when an entrepreneurial endeavor evolves from a Type One to a Type Two condition is likely to be a difficult problem. For example, different functions in an entrepreneurial venture may evolve from Type One to Type Two conditions at different rates.

There may be, for example, considerable uncertainty about what a customer's final product preferences will be, but much less certainty—although some important risk—regarding how a venture's products should be produced. Therefore, a single endeavor may be operating, simultaneously, under conditions of uncertainty and under conditions of risk. The practical implications of this kind of "organizational schizophrenia" deserve further attention.

Implications for Practice

The field of entrepreneurship has grappled for the last four decades for a theory of entrepreneurship. There have been papers suggesting it is not about the person, papers suggesting it is about the context, papers suggesting it is about how a person thinks, and papers that suggest it is about how a person feels. As each paper has become part of the entrepreneurship research lexicon, the debate has been about whether the different theory was wrong and whether any one theory is the grand theory of entrepreneurship. In all probability, there is no one theory that is the grand theory of entrepreneurship but theories that together give a more complete view of entrepreneurship than each does alone. The boundary conditions of each theory, and when each theory applies, help us understand entrepreneurship more clearly today than probably at any other time in our history.

In the end, Blank and Eckhardt's (2023) effort to identify the relationship between the entrepreneurship model in *The Lean Startup* and current theories in the field of entrepreneurship has led to a surprising outcome: It may be that theories in the field can be grouped into two relatively homogenous and complementary families. Recognizing these two sets of theories, and when they are and are not applicable, is likely to have profound effects on entrepreneurial practice. Instead of assuming that all entrepreneurial endeavors should implement the idea that pitches can be developed into opportunities, or apply the *Lean Startup* method, the analysis here suggests that entrepreneurs should first seek to understand the context within which they are operating. Applying Type Two Theories in conditions of uncertainty that are more consistent with Type One Theories is likely to be no more successful than applying Type One Theories in conditions of risk that are more consistent with Type Two Theories.

In turn, while some entrepreneurship scholars will prefer to continue to elaborate important differences among the theories within these different family groups, and still others will elaborate still more new theories that can fit within these groups, the analyses in this paper suggests that understanding the boundary conditions when these different theory families do and do not apply is an important scholarly endeavor and an endeavor that can have important practical implications for all kinds of entrepreneurs.

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Notes

1. There are also several approaches being advanced, consistent with *The Lean Startup* assumptions, that opportunities are pre-existing and can be discovered through systematic searches. These include Discovery Theory (Shane, 2003), IO Nexus (Eckhardt, Houston, Jiang, Lamberton, Rindfleisch, & Zervas, 2019), Entrepreneur-as-Scientist Method (Zellweger & Zenger, 2023), and entrepreneurship as theory (Felin, Gambardella, Stern, & Zenger, 2020). This paper considers these theories to be Type Two Theories.

2. Creation Theory and theories in entrepreneurship of Effectuation (Sarasvathy, 2001) and Bricolage (Baker & Nelson, 2005) are considered Type One Theories.

3. Path-dependent processes also play an important role in other social science theories, including resource-based theory in strategic management (Barney, 1991; Dierickx & Cool, 1989). In a sense, these theories emphasize the importance of information and knowledge generated from the process of enacting an opportunity. It is not surprising that Apple's competitors criticized Apple when Steve Jobs was alive by suggesting that they—the competitors—lived outside of Jobs' inner circle. By not being part of the process of constructing a new social reality—or, as Barney (1995) would suggest, a socially complex process—Apple's competitors were unable to imitate Apple's products. As the process of enacting an opportunity evolves differently for different entrepreneurs, the opportunities that result may be heterogeneous in costly-to-copy, and costly-to-reverse ways (Barney, 1995).

4. The creation process may begin before we have a language; the development of language is not theological. When language and action are related, and language is used to coordinate cooperative activity, then you have teleology—because the action and coordination involve teleological reasoning. If language is absent action, however, it is not teleological. Creation can be teleological when action becomes purposeful, but it does not necessarily start there.

5. A market may consist of two individuals.

6. A debate best left to philosophers and not to business scholars.

7. Information asymmetries occur when one party to an economic transaction possesses greater knowledge than the other party (Akerlof, 1970). These asymmetries in transactions represent a seller knowing more than a buyer or a buyer knowing more than a seller. This fundamental assumption of information asymmetries underpins the assumption of the Lean Startup design suggesting a quasi-scientific approach with its testable hypotheses (Blank & Eckhardt, 2023). The Lean Startup posits that there is sufficient information in the discovery process to formulate a hypothesis to clear up the information asymmetry. This is consistent with conditions of risk—those of information asymmetries—not conditions of uncertainty, where knowledge does not yet exist.

8. The Lean Startup suggests the use of testable hypotheses but then specifies conditions of uncertainty. A testable hypothesis is a statement that proposes a possible explanation to a phenomena or event and includes a prediction about the outcome (Helmenstine, 2023). In order to have a testable hypothesis, the researcher needs to have both an independent and dependent variable that is provable or disprovable, it has to be reproducible, and have enough data gathered to draw a credible result. This is not internally consistent with the Lean Startup definition of uncertainty taken from (Pearce, 1992), "that uncertainty is an event where no probability distribution can be assigned to the likelihood of an event occurring" (Blank & Eckhardt, 2023: 10). Testable hypotheses cannot be derived in conditions of uncertainty, as defined by Blank and Eckhardt.

9. Not all the theories mentioned in Blank and Eckhardt (2023) neatly fit into the two "theory families" that are discussed here. Some seem relatively tangential to entrepreneurship as a field, and others (e.g., the Individual/Opportunity Nexus Model; Eckhardt, 2014) seem more like broader organizing frameworks than specific theory of entrepreneurial action.

10. This kind of training does improve entrepreneurial outcomes, but has little to say about how entrepreneurs form their initial ideas about what opportunities they might want to exploit—a topic more successfully addressed by Type One Entrepreneurship Theories.

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The Lean Impact Start-Up Framework: Fueling Innovation for Positive Societal Change

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How can innovative solutions to address societal grand challenges be cultivated in a pragmatic and impactful way? In this article, we propose the "lean impact start-up" framework, which integrates the principles of the lean start-up methodology with fresh perspectives from new stakeholder theory—and specifically, stakeholder governance. The lean impact start-up framework is characterized by its experimental and learning-oriented nature and consists of a three-step process: value search, value creation, and value distribution. For each step, we propose a key mechanism and chart pathways for future research. At its core, the lean impact start-up framework differs from other start-up frameworks by an active consideration of diverse primary stakeholders and an expanded focus encompassing both economic and noneconomic outcomes. This framework serves as a transformative bridge that helps to close the divide between scholarly research and tangible, real-world impact.

Keywords: *societal impact; lean start-up; stakeholder theory; value search; value creation; value distribution*

Management scholars have long debated—sometimes heatedly—how to enhance practical relevance in academic research and theory (Baldridge, Floyd, & Markóczy, 2004; Newman, Cherney, & Head, 2016; Shepherd & Gruber, 2021). One potential solution is to integrate academic theories with practitioner-focused theories derived from and validated by practitioners' experiences. For example, Blank and Eckhardt (in press) demonstrate ways to

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integrate the lean start-up approach, one of the most impactful practitioner-oriented frameworks (Córdova, 2019; Satell, 2017), with selected academic theories of entrepreneurship (e.g., structure view, opportunity creation, effectuation, bricolage, organization learning, and corporate innovation).

Inspired by Blank and Eckhardt's (in press) work, we propose the *lean impact start-up* framework, which merges the lean start-up approach that emphasizes experimentation, iterative learning, and customer-centric innovation (Blank, 2013; Lizarelli et al., 2022; Shepherd & Gruber, 2021) with principles of new stakeholder theory (e.g., McGahan, 2023). Specifically, we extend recent foundational work on stakeholder governance (Amis, Barney, Mahoney, & Wang, 2020; Bacq & Aguilera, 2022; Bridoux & Stoelhorst, 2022) and provide practice-oriented insights into delivering innovation to solve societal grand challenges, such as climate change, water pollution, systemic poverty and inequality, and global health crises.

Societal grand challenges are complex, systemic issues with multifaceted unclear causes and effects; tackling them requires collaborative and long-term efforts between multiple societal sectors (Aguilera, Aragón-Correa, & Marano, 2022; Berrone, Gelabert, Massa-Saluzzo, & Rousseau, 2016; Ferraro, Etzion, & Gehman, 2015). Organizations face obstacles in addressing societal grand challenges, such as the large scope and complexity of issues, the lack of clear cause-and-effect relationships, limited resources, and the need for coordinated action among multiple entities. Thus, effective decision-making and problem-solving strategies to address such challenges are not only valuable but also timely (Markman, Waldron, Gianiodis, & Espina, 2019; Wright & Nyberg, 2017). In particular, start-ups may provide an essential and distinctive avenue for navigating societal grand challenges as they are nimbler and often closer to local manifestations of these challenges than large corporations (Bacq & Lumpkin, 2021; Dean & McMullen, 2007; Markman et al., 2019). Start-ups also have a distinct advantage in driving transformative innovations because they are less bound by established norms and can explore new approaches to solving grand challenges. However, it is worth noting that start-ups may encounter limitations in rapidly achieving scale, a concern amplified by the urgency associated with addressing many pressing grand challenges. Consequently, the lean impact start-up framework responds to the need for problem-oriented, impact-focused approaches to solve grand challenges based on pragmatism, active experimentation, and iterative testing (Ferraro et al., 2015).

By merging insights from new stakeholder theory—and specifically, stakeholder governance—we extend the conventional lean start-up framework in three ways. First, we provide an expanded lean start-up model that can be applied to address intractable social and environmental issues. Second, building on the recent inclusion of the Market Opportunity Navigator ("where to play") in the lean start-up tool sets (Gruber & Tal, 2017, 2024), we emphasize the importance of accounting for the priorities of multiple primary stakeholders (i.e., individuals or groups with a direct stake in the start-up's business model), encompassing diverse interests, values, and perspectives. Third, our lean impact start-up framework complements extensions of the traditional lean start-up approach (Gruber & Tal, 2024) and leverages recent theory to systematically account for multiple outcomes, including economic, social, and environmental impacts. By illuminating the processes and activities associated with lean impact start-ups, we strive to help create more effective strategies for start-ups and larger organizations in their efforts to address grand challenges, thereby enhancing the relevance of

scholarly research to practitioners.[1] In the following sections, we first summarize the barriers entrepreneurs and organizations face in addressing societal grand challenges. Next, we explore how the lean start-up approach, as a pragmatic applied theory, can provide valuable insights and practical tools for developing innovation that brings about positive societal change and draw links to stakeholder governance. We then propose key mechanisms for cultivating innovative solutions to societal grand challenges and set forth the lean impact start-up framework, which we compare with the conventional lean start-up framework. We conclude by discussing future research directions in this domain.

Obstacles to Addressing Societal Grand Challenges

Societal grand challenges are complex, dynamic, seemingly intractable issues, characterized by interlocking system-based root causes that resist easy fixes (Berrone et al., 2016; Ferraro et al., 2015). George, Howard-Grenville, Joshi, and Tihanyi (2016: 1881) suggest that solving grand challenges "require[s] coordinated and sustained effort from multiple and diverse stakeholders toward a clearly articulated problem or goal." In a similar vein, Aguilera et al. (2022) call for more collaborative arrangements that integrate a broader set of interests. However, despite the growing recognition of the importance of addressing societal grand challenges, organizations face significant obstacles in innovating to address them.

One major obstacle is the large scope and multiple sides from which actors can view societal grand challenges (Wijen, 2014; Wijen & Flowers, 2023). Different actors may have different perspectives on what constitutes a societal grand challenge, which makes it difficult to identify and prioritize specific problems to address. For instance, for the issue of water scarcity, a nonprofit organization might emphasize the human right to clean water and advocate for direct resource allocation to affected communities. Conversely, a multinational beverage company might focus on improving efficiency in water usage during production to reduce its costs. Meanwhile, a local government might prioritize building and upgrading infrastructure, such as water delivery systems. Consequently, differing perspectives may complicate prioritization and collaborative problem-solving efforts.

A second obstacle is the lack of clear cause-and-effect relationships between different aspects of societal grand challenges. This makes it difficult, on the one hand, to identify and deliver innovative solutions (because the feedback loop is imperfect) and, on the other hand, to achieve the desired outcomes. As a result, many societal grand challenges require significant investments in research and development, technology, and infrastructure, which may be beyond the financial capacity of many organizations (George et al., 2016; Olsen, Sofka, & Grimpe, 2016). Additionally, some of these challenges likely require long-term commitments and collaborations that extend beyond the typical time horizon of business planning and executive leadership cycles.

A third obstacle is the complexity and interconnectedness of societal grand challenges. Accordingly, the outcomes of potential solutions are multifaceted; they might be beneficial to some but have adverse effects on others. Because of this, solutions to societal grand challenges can be shaped by the interrelationships and interactions of multiple actors, including governments, businesses, civil society organizations, intermediaries, and individuals, across sectors and countries (Liu, Wang, & Li, 2022; Maksimov, Wang, & Yan, 2022; Wang & Li, 2019). Nevertheless, coordinating and aligning the interests and actions of diverse actors is

challenging, particularly when there are divergent views on the consequences of tackling these challenges.

Recognizing these obstacles to addressing societal grand challenges, scholars have discussed how new ventures might be better suited to innovating or commercializing solutions to these challenges (Dean & McMullen, 2007; Markman et al., 2019). Complex and systemic grand challenge problems require fresh perspectives and creative solutions that start-ups are uniquely positioned to deliver. Characterized by agility, innovation, and an entrepreneurial mindset, start-ups can also provide a vital avenue for navigating grand challenges by disrupting existing norms (Battilana, Leca, & Boxenbaum, 2009). In particular, some scholars have advocated for "problem-oriented and impact-focused approaches" by drawing insights from "pragmatism that emphasizes a situated, distributed, and processual approach to problem solving" (Ferraro et al., 2015: 364). This pragmatic approach entails identifying multiple opportunities to solve the problems, assessing these opportunities, and subsequently focusing on the most promising one while keeping other viable options accessible. To accomplish this, start-ups need to actively experiment, test, revise, and retest their hypotheses pertaining to the problems and opportunities at hand while engaging a broad stakeholder net. Thus, in the following section, we first introduce the lean start-up approach as a pragmatic applied theory before explaining how it can provide valuable insights and practical strategies for addressing societal grand challenges and bringing about positive societal change.

Lean Start-Up Contributions to Innovation for Positive Societal Change

As an applied theory, the groundbreaking lean start-up approach is widely used in modern entrepreneurship (Córdova, 2019; Satell, 2017). Traditionally, it emphasizes the importance of rapid experimentation, customer feedback, and iteration to develop innovative solutions that meet customer needs while minimizing waste and maximizing resource efficiency (Blank, 2013; Lizarelli et al., 2022). We propose that the lean start-up approach can be extended to societal grand challenges by leveraging its widely recognized strengths: speed, user focus, process management, flexibility, and waste elimination.

First, in the problem definition phase, the lean start-up approach emphasizes the importance of identifying and prioritizing customer needs and pain points—in other words, "where to play" (Gruber & Tal, 2017). This phase—which we refer to as the *value search* step in our framework—is critical in assessing whether or not an entrepreneur is pursuing a worthy opportunity, given both their ambitions and customer needs. While value search as an activity is not fully captured in the traditional lean start-up approach, Gruber and Tal's (2017) Market Opportunity Navigator complements the gap in the original framework.[2] Using the Market Opportunity Navigator allows an entrepreneur to identify various market opportunities that align with their distinctive capabilities, assess the potential and challenges of each before honing in on the most promising one(s), and, finally, rank the opportunities so that the lean experimentation takes place within set boundaries. We apply the Market Opportunity Navigator's principles in our conceptualization of value search.

Addressing societal grand challenges requires a deeper understanding of their root causes and systemic drivers. As the initial step in our framework, value search entails assessing the abilities and priorities of a wide range of stakeholders, including those most affected by the societal grand challenge. This broader and more inclusive understanding can inform the

development of more targeted and effective solutions that address the specific needs and concerns of key stakeholders (Lumpkin & Bacq, 2019).

The second way the lean start-up approach can be extended to societal grand challenges is in the solution development phase. It emphasizes rapid experimentation and iteration to develop and refine solutions that are effective, efficient, and scalable—thus, "how to play." This involves testing and validating assumptions about the feasibility, viability, and desirability of different solutions and applying user feedback to refine and improve these solutions over time (Ramoglou, Zyglidopoulos, & Papadopoulou, 2023). Since the solutions to societal grand challenges are largely unknown, this hypothesis-driven approach embedded in community engagement is critical to decreasing both implementation costs and resource waste through timely pivoting. We call these steps "value creation" and "value distribution" in our framework.

By proposing the lean impact start-up framework, we aim to make three major theoretical extensions. First, we expand the application of the lean start-up approach to societal grand challenges by elaborating on the "execute" step in the process. Doing so requires adopting a multistakeholder view to initiative building, anchored in longer time horizons. Second, we extend the lean start-up approach's traditional emphasis on one stakeholder, the customer (Ramoglou et al., 2023). While it is primordial to identify customer needs and develop solutions that meet those needs, customers alone are likely not sufficient to address societal grand challenges that require the involvement of a broader range of stakeholders in the decision-making process. In reality, for solutions targeting basic needs, the customers frequently differ from the actual users who are most impacted by these needs. Customers and actual users typically possess varying interests, values, and viewpoints. We use the term "primary stakeholders" to refer to the individuals or groups that have a direct stake in the start-up's business model. We argue that effectively engaging primary stakeholders requires more than just market validation. Finally, we extend the lean start-up approach by exploring how it can prioritize social and environmental outcomes as much as economic outcomes. While the addition of the Market Opportunity Navigator to the lean start-up methodology (Blank, 2019; Blank & Eckhardt, in press; Gruber & Tal, 2017) expands the horizons of start-up thinking and facilitates a broader market exploration, the multifaceted complexities of societal grand challenges are not fully fleshed out. They require an innovation and inclusion mindset that transcends traditional market dynamics to actively engage different stakeholders in creating and distributing value based on social and environmental needs.

Linking Stakeholder Governance to the Lean Start-Up Approach

Organizations dedicated to advancing positive societal change aim to develop a business model that creates both economic and noneconomic value. In this section we link stakeholder governance with the nature of value and the process of creating and distributing value.

Primary Stakeholder Multiplicity and Noneconomic Interests

To begin this journey, entrepreneurs need to grapple with an initial set of questions: What value to create, and what does noneconomic value mean? Does the goal refer to enhancing the well-being and quality of life of an underprivileged group? Or does it refer to reducing climate harm or preserving natural resources?

The question of value is inherently subjective: It is contingent on who perceives the value (Young, 2006). That is, a lean impact entrepreneur may have a clear idea of what it means to enhance well-being of an underprivileged group, but that idea may not match what those who are most affected by the grand challenge deem as valuable or, indeed, necessary. By contrast, economic value is easier to define—and to measure, using monetary values that consist of a single metric. A certain amount of money (e.g., sales, return on assets) typically represents the success—or failure—of a start-up, and key actors, including the entrepreneur, funders, and employees, quickly come to align around this metric. In the context of societal grand challenges, the lean impact start-up framework demands a theoretical lens that can accommodate a wide variety of stakeholders whose interests are diverse and for whom value may go well beyond narrow economic concerns (Aguilera et al., 2022; Bingham, Dyer, Smith, & Adams, 2011; Cuypers, Koh, & Wang, 2016; Sharma & Henriques, 2005).

New stakeholder theory is a descriptive academic theory that focuses on explaining variations between stakeholder management and experience, on the one hand, and a broad range of organizational outcomes, on the other hand (McGahan, 2023). Indeed, this new theory aims at offering a variety of mechanisms for reconciling the conflicting economic and noneconomic interests of multiple stakeholders (Bacq & Aguilera, 2022; McGahan & Pongeluppe, 2023). Reflecting Donaldson and Preston's (1995) notion of instrumentalism, new stakeholder theory withholds normative judgment on the desirability of the goals, objectives, or practices of stakeholders (McGahan, 2023).

Whereas conventional stakeholder theory primarily focuses on stakeholder management from the perspective of a focal organization and within existing governance structures, new stakeholder theory conceives of an organization as a team production function through which stakeholders with a common goal decide on (a) what value to create, (b) for whom, and (c) which governance principles should guide the allocation of that value (Bacq & Aguilera, 2022). As such, it aims to transform governance practices to give stakeholders a more active role in decision-making and to hold organizations accountable to a wider range of interests. New stakeholder theory rests on two canonical questions (McGahan, 2023):

1. Which stakeholders to create value for—that is, "who is in and who is out"—and what do they value?
2. How to distribute the value once created?

Applying new stakeholder theory principles of stakeholder governance to product and service innovation for addressing societal grand challenges, we see that the group of primary stakeholders goes well beyond customers (those who engage in a commercial transaction with the business) as in the conventional lean start-up approach. Put differently, addressing societal grand challenges with a lean start-up approach rests on acknowledging the multiplicity of primary stakeholders.

In the lean impact start-up framework, primary stakeholders include the beneficiaries as target users of the solution, the suppliers, the funders, and the supporters writ large. Each of these stakeholders may weigh different elements of the value proposition differently. For example, in the case of a social enterprise in a developing country that aims to improve water and sanitation in a slum by means of franchised, portable, safe, and clean toilets, the slum inhabitants are the enterprise's primary stakeholders as the target users of the solution. The value they perceive is both noneconomic—that is, access to clean and safe sanitation

facilities, which prevents the groundwater from being polluted and enhances the health of the entire community—and economic—that is, the franchisees make a living by claiming a small fee for each toilet use. Yet, the slum inhabitants are not the only primary stakeholders. To generate earned income, this enterprise has developed an innovative treatment for the human waste collected from its toilets that it transforms into fertilizer. Surrounding farmers thus constitute another primary stakeholder group, since their purchase of the fertilizer is critical to the venture's financial viability. In other words, it is imperative that the farmers see value in the fertilizer—without their support, the enterprise cannot survive. Importantly, this enterprise would never have been founded without the seed capital provided by early-stage funders and supporters.

By identifying stakeholders and their priorities, stakeholder governance helps design the participatory rights and responsibilities assigned to the multiple primary stakeholders of an organization (e.g., shareholders, employees, suppliers, consumers, beneficiaries), which then guide their interactions with the organization (Bacq & Aguilera, 2022). It provides clarity on what primary stakeholders value (i.e., value search) and how to prioritize stakeholders' possibly competing demands. To shed light on these issues, next we unpack the process of stakeholder governance in the context of the lean impact start-up framework.

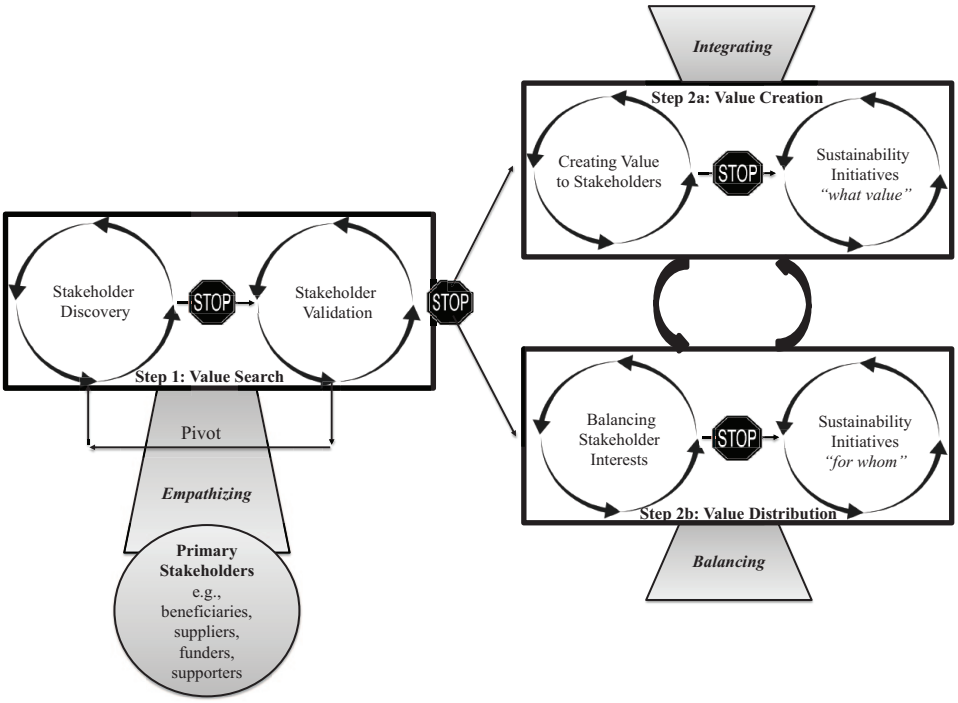
A Dual Process of Stakeholder Governance: Value Creation and Value Distribution

Recent developments of new stakeholder theory emphasize the incorporation of value creation and value distribution into organizations' overall strategy (Amis et al., 2020; Bacq & Aguilera, 2022).[3] *Value creation* (Step 2a) focuses on the process of generating or adding value to a solution (e.g., product, process, or service). The key is to build on the learnings from value search (Step 1) to then develop and deliver an innovative and satisfying solution that simultaneously recognizes primary stakeholders' needs and preferences and taps into the entrepreneur's capabilities and strengths. In other words, the goal is to create value that is appreciated jointly by the entrepreneur and by the set of primary stakeholders.

Value distribution (Step 2b) focuses on allocating the value created among the multiple primary stakeholders. To do so, the entrepreneur differentiates between different kinds of primary stakeholders: entitled and enfranchised (Bacq & Aguilera, 2022). *Entitled stakeholders* are the group of individuals or communities "for whom" a lean impact entrepreneur has decided to create value—and declared this in the mission statement. Typically, they are the nonpaying (but possibly contributing in nonmonetary ways) beneficiaries of the positive change created by the start-up. They are the users of the aforementioned portable toilet and, as such, entitled stakeholders; the lean impact entrepreneur intends to create value for and distribute value to them. *Enfranchised stakeholders*, by contrast, are the individuals or groups that contribute resources and capital to the venture. These include customers (contribute payment), suppliers (contribute resources and materials), funders (contribute financial capital), and volunteers (contribute time), among others.

Since they aim to produce positive societal change, lean impact entrepreneurs will use these different categories of stakeholders as guideposts to prioritize different kinds of value creation and to make decisions on how to redistribute the value once created. We outline next how they do so by means of the lean impact start-up framework.

Figure 1
The Lean Impact Start-Up Framework: Steps and Mechanisms



The Lean Impact Start-Up Framework

The lean impact start-up framework contributes to deepening our understanding of the stakeholder governance mechanisms that enable the creation of value for the start-up's multiple primary stakeholders and the distribution of value among all intended stakeholders.

The conventional lean start-up process is divided into two steps, named *search* and *execute*, each based on two underlying phases: customer discovery and customer validation in "search" for a market opportunity, and customer creation and company building to "execute" (Blank & Eckhardt, in press). In the context of societal grand challenges, we propose three steps to the lean impact start-up framework (see Figure 1). We outline them next.

Step 1: Value Search Through Empathizing

We break down the first step, value search, into the phases of stakeholder discovery and stakeholder validation. The goal is similar to the traditional lean start-up model with the addition of the Market Opportunity Navigator, that is, to achieve a fit between the product or service offered by the start-up and its primary stakeholders' needs and demands. Yet, value search in our framework is much broader than focusing on an already identified customer who needs to get known better (i.e., "how to play," not "where to play"). Value search in the

lean impact start-up framework entails identifying all types of stakeholders concerned by the societal issue. Metrics in this first step consist of knowledge that the lean impact start-up has accrued about two questions, which match the two phases: "Who are the primary stakeholders?" (stakeholder discovery) and "What are their pains and gains, in other words, their understanding of the problem and or a desirable solution?" (stakeholder validation). A critically unique aspect of lean impact start-ups is the multiplicity and heterogeneity of primary stakeholders. The lean impact entrepreneur thus needs first to engage in stakeholder mapping, "the process of identifying primary stakeholders (i.e., individuals or groups with a vested interest in [their] product or project) and understanding their relationships with each other."[4] Once the entrepreneur has iterated a few times to identify the start-up's primary stakeholders, they can engage in empathy mapping, a process intended to gain a deep understanding of the impact problem from the perspective of the individuals, communities, and stakeholders it affects (Bacq, 2017).

Rooted in design thinking principles, the lean impact start-up framework provides entrepreneurs with an opportunity to potentially have and sustain a meaningful impact on individuals and communities in need by addressing a social or environmental problem that affects them. There is ample evidence that empathy is a critical driver of social entrepreneurial action (Bacq & Alt, 2018; Mair & Noboa, 2006). It is therefore critical for lean impact entrepreneurs to describe every facet of the problem from the perspective of the people affected by it—or "users" of the designed solution.

Empathy comprises both a cognitive and an affective aspect. On the one hand, *cognitive empathy*, also known as perspective taking, refers to an individual's disposition to understanding others' points of view. On the other hand, *affective empathy*, also known as empathic concern, refers to someone's ability to experience feelings of warmth and compassion for others (Davis, 1980). Empathy with the target users comes from insights gathered from secondary sources or—even better—from primary sources, such as interviews with the concerned parties or, if this is not possible because of geographical distance or a sensitive context, with individuals who are close to users, such as a local nongovernmental organization (NGO).

As such, empathizing aims to verify assumptions about who the primary stakeholders are (and, relatedly, gaining clarity on what value they long for). Indeed, as in traditional business and marketing, identifying the key decision-maker (not so much in terms of willingness to pay as in terms of what change in society is deemed of value) is essential. For instance, when targeting children's vaccination, entrepreneurs need to talk to and gather information from the children's parents. In this regard, economists from Massachusetts Institute of Technology's Abdul Latif Jameel Poverty Action Lab found that small incentives have large positive impacts on the uptake of immunization services in resource-poor areas and are more cost-effective than merely improving supply (Banerjee, Duflo, Glennerster, & Kothari, 2010). In Banerjee et al.'s (2010) study, small incentives, such as a kilogram of lentils, gave mothers and caregivers a reason to act today, as opposed to delaying a child's immunization with detrimental and potentially fatal health outcomes. Such innovation, an outcome of the empathizing process, can help address the societal grand challenge of high child mortality.

By contrast, positive societal-change initiatives based on unverified assumptions risk doing no good at all and can even be harmful. For instance, Haugh and Talwar (2016) provide evidence of the social harm that well-intentioned women empowerment initiatives can cause

in the short term to women in cultures that value and stress female compliance with traditional rules and norms. Therefore, entrepreneurs intending to bring about positive societal change need to test their assumptions with target users (as a primary stakeholder group) to gauge their reality and experience of the problem. Combining desk research and interviews with primary stakeholders, entrepreneurs are invited to ask and answer the following questions about their target users' daily life experiences (Bacq, 2017):

- What do they hear? What do friends and family say? Who influences them and how? What communication channels are most reliable or useful?
- What do they think and feel? What is really important to them? What drives them? What worries them?
- What do they see? What does it look like around them? Whom do they see? Who are their friends? What problems do they have?
- What do they say and do? What is their attitude? What do they say to others? What do they show in public?

A good practice is to start forming a persona that encapsulates the characteristics of the target users and to choose a contextually adequate name (Ferreira, Silva, Oliveira, & Conte, 2015). Then, the lean impact entrepreneur can summarize the most salient pains for their target persona as well as the gains that they could most benefit from. By carefully studying the problem from the perspective of those experiencing it, the entrepreneur is well positioned to start framing it as an opportunity in line with the five dimensions of social entrepreneurship opportunities as proposed by Zahra, Rawhouser, Bhawe, Neubaum, and Hayton (2008): prevalence, relevance, accessibility, urgency, and radicalness.

At this initial stage, the lean impact entrepreneur aims to identify two crucial aspects: first, to determine the key stakeholders for whom value will be created through stakeholder mapping; second, to understand what constitutes value for these stakeholders, achieved through empathizing. Although identifying the primary stakeholders is a critical starting point, it is also essential to consider alternative targets for value creation. This involves a comprehensive assessment of the potential for creating diverse social or environmental impacts, each varying in terms of its scale, reach, and significance. Consequently, entrepreneurs may evaluate the multifaceted consequences that their value creation efforts might yield, considering how these impacts can manifest at different levels within society. This process is akin to developing the "Attractiveness Map" in the Market Opportunity Navigator (Gruber & Tal, 2024), where the entrepreneur evaluates preferences and needs to determine the most promising avenues for value creation.

It is important to emphasize that in the lean impact start-up framework, value-based decisions are not made primarily from an organizational perspective. Indeed, the raison d'être of the start-up is primarily to address a human-centered or environmental societal grand challenge and that the value created effectively reaches its target users.

Step 2a: Value Creation Through Integrating

This second step, value creation (Step 2a), consists of two iterative phases. The first phase consists of creating value for primary stakeholders, likely a mix of economic, social (e.g., giving an underprivileged population access to regular nutritious food, housing, or market

reentry activities), and/or environmental value (e.g., preserving water resources and the local natural environment). By engaging iteratively with the set of primary stakeholders, in the first phase the entrepreneur addresses the following question: What value mix to create?

The second phase consists of a focused business model development process to design a scalable, replicable business model that can support the creation of value—both social/environmental and economic. The entrepreneur will thus need to ensure that the start-up is set up to, for example, deliver cleaner water systems, remove long-standing inequalities, and provide opportunities to those living in poverty. Yet, beyond its main mandate of bringing about positive societal change, the start-up needs to generate revenue by selling products and services, whether related to the core mission or not. For instance, a work integration social enterprise creates social value for those excluded from the employment market, such as ex-convicts or people with a disability, and generates economic value by selling products and services. Such activities could leverage the skills of those previously excluded from job opportunities. For instance, workers with autism could be employed to perform tasks that require a lot of attention to detail. In the case of an impact start-up aiming to alleviate marine pollution, revenue-generating activities could be selling tote bags or flip-flops made out of plastic retrieved from the ocean. In the lean impact start-up framework, we call the mechanism underlying value creation (Step 2a) *integrating*.

In this context, value creation thus relies on the ability to harmonize various aspects of a lean impact start-up's operations to achieve its dual objectives by creating both societal and economic value. It involves seamlessly integrating the social, environmental, and economic dimensions of a start-up's mission and activities to maximize positive impact. For instance, when building the minimum viable product (MVP), lean impact entrepreneurs ensure that their product or service aligns with the start-up's dual mission. Similarly, when seeking feedback, lean impact entrepreneurs track not only traditional metrics, like revenue and customer acquisition, but also metrics related to their mission, such as the number of lives improved or environmental benefits achieved.

Step 2b: Value Distribution Through Balancing

Value distribution (Step 2b) also consists of two iterative phases. The first phase consists of finding a balance between multiple stakeholders' interests in such a way that it is possible to prioritize which stakeholders to distribute the value to. Take the example of a lean impact entrepreneur who has designed a business that produces nutritious insect-based food with both social (i.e., providing nutritious food at an affordable price to underserved communities) and environmental value (i.e., reducing meat consumption and CO_2 emissions) as well as economic value (i.e., gaining part of the sizable market share for such products). Value distribution in this example begs the following questions: Who should get the value first: the communities or the financial supporters? Can some food be distributed first and the investors paid later? What is the appropriate balance? The answer likely lies in balancing blended goals, as vastly discussed in the literature on social entrepreneurship and hybrid organizations (see Battilana & Lee, 2014; Vedula et al., 2022). Such a balancing act requires that the lean impact entrepreneur (a) does not lose sight of their mission, which serves as a compass, and (b) keeps generating enough revenues to support sustained execution for all intended stakeholders. In the lean impact start-up framework, we call the mechanism that underlies value distribution (Step 2b) *balancing*.

The goal of balancing is to adjust or manage the value distribution process, ensuring the stability and viability of relationships with primary stakeholders. If they do not effectively balance value distribution among primary stakeholders, lean impact start-ups are more likely to fail. For instance, the One Laptop per Child program aimed to provide low-cost laptops to the poorest elementary school children in developing countries to bridge the digital divide. Although the project initially succeeded in earning targeted advertising and corporate in-kind support (one enfranchised stakeholder), it failed to deliver the learning outcomes and have the desired educational impact for the students (one entitled stakeholder group). The reason is that U.S.-centric laptops were not appropriate for the target countries and lacked customization to local cultures and traditions (Colombant, 2011). The project also ignored one important stakeholder: information technology support for the deployed laptops (another enfranchised stakeholder). Without the engagement of that key stakeholder, technical issues and malfunctioning laptops resulted in reduced laptop usability and, therefore, impact.

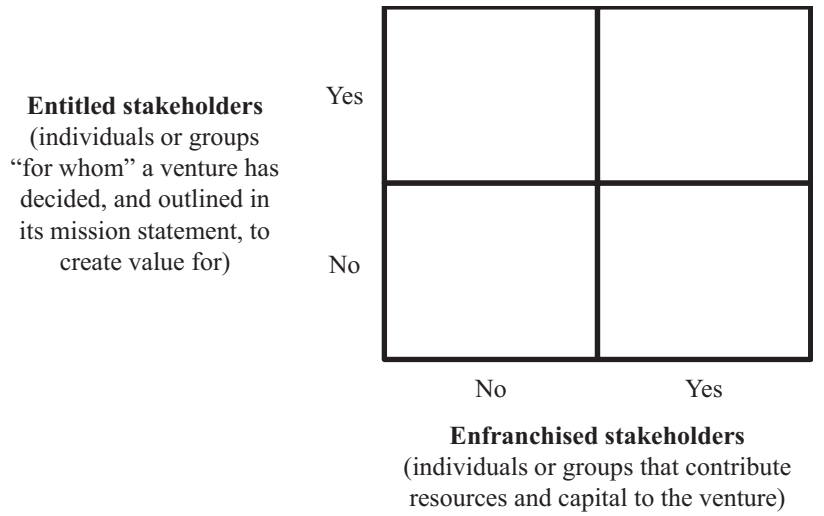
It is important to note that the later steps value creation (Step 2a) and value distribution (Step 2b) are not entirely sequential or strictly linear. Although value creation needs to happen before value can be distributed, there are feedback loops from value distribution back to value creation. This interconnectedness emphasizes the dynamism and experimentation inherent in the lean start-up approach, which fosters a responsive and evolving model of entrepreneurship for positive societal change. Next, we provide a fuller picture of the similarities and differences between the conventional lean start-up approach and our lean impact start-up framework.

Comparing the Conventional Lean Start-Up Approach and the Lean Impact Start-Up Framework

We have explained how the lean impact start-up framework uniquely extends the lean start-up approach by incorporating insights from new stakeholder theory—and specifically, stakeholder governance. In our framework, we propose three mechanisms—empathizing, integrating, and balancing—that underpin each step and provide lean impact start-up entrepreneurs with an actionable tool set to effectively create positive societal change through establishing viable businesses.

A notable distinction between the two approaches is that the lean impact start-up framework includes an additional step: value distribution. At the core of this additional step is the principle of fairness. It ensures that all stakeholders, not just a select few, benefit from the value created by the lean impact start-up. Value distribution ensures that the benefits are directed to the intended beneficiaries, reinforcing the venture's impact goals to address a societal grand challenge. During the process, ventures need first to map out entitled stakeholders ("for whom" a venture creates value) and enfranchised stakeholders (i.e., individuals or groups that contribute resources and capital to the venture) (Figure 2). More importantly, they need to ensure that entitled stakeholders comprise target beneficiaries or recipients of the value while recognizing the contributions of enfranchised stakeholders and rewarding them accordingly. As a result of this third step, a lean impact start-up can efficiently create solutions that genuinely address a grand challenge. Table 1 provides a snapshot of the lean impact start-up framework.

Figure 2
Value Distribution Navigator



We systematically summarize the convergent and divergent foci between the conventional lean start-up approach and our lean impact start-up framework in Table 2. In terms of convergent foci, both approaches employ a scientific method centered on generating a set of market opportunities, experimentation, and feedback-driven learning processes to minimize uncertainty and waste. They both prioritize the swift development and iteration of an MVP to deliver innovative solutions more efficiently. These methodologies underscore the importance of a rapid launch, followed by iterative adjustments that harness the "build-measure-learn" feedback cycle for expedited market entry and growth. Essentially, we are able to extend the conventional lean start-up approach to better accommodate business model innovation focused on addressing societal grand challenges.

There are some key distinctions between the two frameworks in terms of context, motivation, innovative activities, stakeholder governance focus, metrics of success, and local and global market dynamics. Conventional lean start-ups primarily focus on improving their chances of success through efficiency and profitability in competitive markets, targeting one primary stakeholder (customers) and prioritizing value creation and appropriation (Leatherbee & Katila, 2020; Shepherd & Gruber, 2021). Although they tend to pursue innovative solutions, conventional lean start-ups operate with an unwavering focus on carving out a niche in competitive markets by focusing on economic outcomes. By contrast, lean impact start-ups diverge by addressing societal grand challenges, emphasizing social impact and environmental sustainability over economic outcomes, engaging with multiple primary stakeholders, prioritizing value creation and distribution, and developing breakthrough innovations to solve complex problems. Finally, conventional lean start-ups often focus on developing products that can easily be transferred to various countries or markets. This emphasis on transferability is driven by the goal of scaling rapidly and achieving widespread market penetration (Blank, 2003; Blank & Dorf, 2012). For this reason, conventional lean start-ups

Table 1
The Lean Impact Start-Up Framework

	Value Search		Value Creation	Value Distribution
Description	a. Stakeholder discovery	b. Stakeholder validation	Creating value for stakeholders—"what value"	Balancing stakeholders' interests—value "for whom"
Goal	Test hypotheses about the problem by engaging stakeholders	Test the solution and the business model by engaging stakeholders	Drive adoption and scale by engaging stakeholders	Make decisions based on the "value distribution navigator"
Activities	• Identify initial target stakeholders and understand their problems • Draft value propositions to solve the problems • Test product hypotheses with these stakeholders via interviews, surveys, etc. • Iterate on feedback to refine understanding of stakeholder needs and problems	• Develop a minimum viable product (MVP) that addresses the main problem • Measure how stakeholders can contribute to the development of the MVP • Develop a sales road map based on this MVP	• Determine the right market type for the venture • Choose the appropriate market entry strategy • Develop a plan to integrate resources and support stakeholders	• Identify entitled stakeholders ("for whom" a venture creates value) • Identify enfranchised stakeholders (i.e., individuals or groups that contribute resources and capital to the venture) • Ensure entitled stakeholders are target beneficiaries or recipients of the value • Recognize the contributions of enfranchised stakeholders and reward them accordingly
Supporting mechanism	Empathizing	Empathizing	Integrating	Balancing
Desired outcome	A clear understanding of the societal grand challenge that the venture is addressing	A validated business model that allows the venture to achieve problem-solution fit	A venture that focuses on efficiency and delivers desired social outcomes	A lean impact start-up that efficiently creates solutions that genuinely address societal grand challenges

Table 2
Comparisons Between the Conventional Lean Start-Up and Lean Impact Start-Up

	Convergent Foci	Divergent Foci	
	Conventional Lean Start-Up and Lean Impact Start-Up	Conventional Lean Start-Up	Lean Impact Start-Up
Context	• An experimentation-oriented scientific approach • Reduce uncertainty and waste in creating and managing start-ups	• Improve the success chances of startups	• Discover innovative solutions to ill-defined, systemic problems • Address global grand challenges facing humanity
Motivation	• Deliver an innovative product/service faster and more effectively	• Mainly economic ○ Efficiency ○ Profitability	• Mainly noneconomic ○ Addressing societal grand challenges ○ Bring about positive societal change
Innovative activities	• Generate a set of market opportunities • Rapidly test and iterate minimum viable products • Gather feedback and pivot • Build-measure-learn feedback loop	• Search for an attractive market opportunity that resonates with customers • Develop a viable option	• Search for an impactful opportunity to address societal grand challenges • Develop an impactful and viable option
Stakeholder governance focus	• Learning oriented • Data driven • Ongoing engagement	• Number of primary stakeholders: one (customers) • Stakeholder governance priority: value creation and value appropriation	• Number of primary stakeholders: multiple (customers, beneficiaries, funders, broader community) • Stakeholder governance priority: value creation and value distribution
Metrics of success	• Time to market • Growth • Runway	• Mainly economic ○ Revenue, customer acquisitions, profit margins	• Mainly noneconomic ○ Stakeholder satisfaction, lifetime value, problem-solving
Local and global market dynamics	• Recognize the impact of government regulation	• Products more readily transferable across countries (more globalization) • More competition across countries	• Products less readily transferable across countries (more localization) • More collaboration across countries
Steps and tools of the start-up process	• Nonlinear process	• Step 1: Market opportunity search Customer discovery Customer validation • Step 2: Execute Customer creation Company building	• Step 1: Value search Stakeholder discovery Stakeholder validation • Step 2a: Value creation Creating value for stakeholders "What value" to create • Step 2b: Value distribution Balancing stakeholders' interests "For whom" to create value

typically face higher levels of competition across different countries as they aim to capture market share and outperform competitors in multiple markets. Conversely, lean impact start-ups, which prioritize creating social or environmental impact alongside economic returns, often deal with products that are less readily transferable to different geographies. This is due to the unique contextual factors and specific needs of the target beneficiaries or communities they aim to serve. In addition, lean impact start-ups place stronger emphasis on understanding and addressing local needs, cultural sensitivities, and socioeconomic factors. Because of this, lean impact start-ups typically collaborate with local organizations, NGOs, governments, or international partners to leverage collective knowledge and resources (Lumpkin & Bacq, 2019).

Discussion

By introducing the lean impact start-up framework, we seek to make the following contributions to the related literature.

First, we provide an expanded lean start-up model that can be applied to grand challenges. Researchers are increasingly interested in innovation as a way to address societal grand challenges (e.g., Bacq & Aguilera, 2022; Voegtlin, Scherer, Stahl, & Hawn, 2022). We extend these studies by offering a practical framework. Specifically, we propose viewing start-ups as initiatives where a more inclusive approach to engaging primary stakeholders as active participants in the value creation and value distribution steps can be adopted. We explain why the conventional lean start-up model, although valuable, may not fully cover the broader considerations required for grand challenges. We encourage start-up entrepreneurs and advisors to understand and integrate multiple stakeholder views. Conceptually, the lean impact start-up framework maps out a continuous and interactive experimentation process that involves stakeholders throughout—from the means to the ends. Practically, the lean impact start-up framework is essential because it enhances the likelihood of creating impactful solutions and promotes efficient and adaptive approaches to complex problems.

Second, we emphasize that the core of the lean impact start-up framework lies in the pursuit of both economic and noneconomic value creation. This process involves continuous feedback and adjustment, reflecting the dynamic negotiation between competing demands highlighted in existing research (Moss, Short, Payne, & Lumpkin, 2011). Indeed, such negotiation tends to reduce uncertainty and promote collective learning at a relatively low cost. Thus, instead of seeing value distribution as a zero-sum game, our lean impact framework views it as a collaborative process, involving active stakeholder engagement over the long run. Lean impact start-ups are thus encouraged to co-create solutions with their multiple primary stakeholders, ensuring that the resulting value is not only generated fairly, as a just representation of the interests of all primary stakeholders involved, but also distributed equitably. The iterative, feedback-driven nature of the framework ensures that this value distribution is continuously refined based on stakeholder input, striking a balance between the needs of the community and the expectations of the other stakeholders.

Finally, the lean impact start-up framework also contributes to the broader stakeholder participation and stakeholder governance literature (Bacq & Aguilera, 2022; Filatotchev & Nakajima, 2014). We extend the existing literature that focuses on the tensions arising from the involvement of stakeholders in legitimating and accepting innovation (e.g., McGahan,

2021, 2023; Scherer, Palazzo, & Seidl, 2013). Specifically, we look at ways for organizations to involve stakeholders in the generation of ideas and facilitation of their implementation. By doing so, our framework bridges existing knowledge to a higher-level question: How is value created for and distributed among stakeholders in order to drive positive societal change? Thus, our lean impact start-up framework goes beyond simply acknowledging the complexities of stakeholder involvement; instead, we delve into actionable steps for harnessing stakeholders' interests and capabilities to create and distribute meaningful and positive societal innovation.

Future Research Directions

We hope that the lean impact start-up framework will inspire scholars to explore further to advance this research agenda. In Table 3, we suggest future research questions regarding the lean impact start-up framework, organized according to the three mechanisms underpinning this framework. By addressing these questions, researchers can advance the understanding of how these mechanisms influence stakeholder dynamics and contribute to the effectiveness and societal impact of the lean start-up approach.

The future research directions we have proposed center on gaining a deeper understanding of the mechanism introduced in each step of our framework. In the case of the first mechanism, empathizing, future research is encouraged to explore its potential in discovering different stakeholders' expectations and needs. Scholars can delve into innovative methodologies and emotional processes that elicit empathy (Cuff, Brown, Taylor, & Howat, 2016; Packard & Burnham, 2021; Shepherd, Seyb, & Williams, 2023). For instance, scholars can investigate how the depth and type of empathy (e.g., hedonic vs. counterhedonic; Shepherd et al., 2023) correlate with effectiveness in understanding stakeholder needs. A related question that warrants more examination is how stakeholders, including beneficiaries, perceive and react to different empathy orientations in lean impact start-ups. Another research area is to explore how cultural, socioeconomic, and technological factors influence the effectiveness of different empathy orientations. In particular, researchers could look at how lean start-ups can leverage emerging technologies, such as artificial intelligence–driven chatbots or sentiment analysis tools, to engage various stakeholders. The potential of technology to mediate empathy and enhance stakeholder understanding is another promising area. Finally, we suggest future researchers pay attention to the potential unintended consequences or risks associated with empathetic stakeholder discovery and how to mitigate them.

For the second mechanism, integrating, future research can explore novel strategies and methodologies through which lean impact start-ups integrate resources to create value. In the context of societal grand challenges, reaching and engaging different stakeholders across countries becomes more critical, and future research could identify effective channels to achieve this as well as integrate resources for different contexts across the globe. In particular, scholars can study effective strategies for mobilizing and allocating the necessary resources, including funding, human capital, and technology, so that lean impact start-ups achieve their social mission. For instance, future research can investigate location-bounded and non-location-bounded comparative advantages and disadvantages of lean impact entrepreneurs integrating stakeholders and their resources across countries as well as consider the unique needs, contexts, and priorities of different regions. Scholars

Table 3
Future Research Questions

Step in the Lean Impact Start-Up	Suggested Future Research Questions
Step 1: Value search	Mechanism: Empathizing
• Stakeholder discovery	• How to identify primary stakeholders of a lean impact start-up? How to understand their perspectives and behaviors? • What role does the local context (e.g., local needs, resources, culture) play in shaping stakeholder discovery for lean impact start-ups? How can these start-ups effectively leverage their local context to reach stakeholders? • What is the potential of technology to mediate empathy and enhance stakeholder understanding, and how can it be effectively utilized? • How can data-driven approaches, such as analyzing social media or online forums, contribute to identifying stakeholders? • How can stakeholders and beneficiaries perceive and react to different empathy orientations in lean impact start-ups? • What are the potential unintended consequences or risks associated with empathetic stakeholder discovery, and how can they be mitigated? • How to effectively align and coordinate the diverse and conflicting perspectives, goals, and expectations of stakeholders? • What are the potential biases and limitations associated with communications with primary stakeholders in lean impact start-ups, and how can they be mitigated?
• Stakeholder validation	• What are the most effective channels and delivery partners for lean impact start-ups to reach and serve their target beneficiaries and customers, and how can these be optimized for different contexts? • What are the cultural and contextual factors that influence the preferences and expectations of stakeholders, and how can lean impact start-ups navigate these factors? • How can lean impact start-ups effectively measure and communicate their social impact, and what are the best practices for doing so in a way that is transparent, accountable, and credible? • How do cultural factors influence stakeholder validation processes, and how can culturally sensitive approaches be developed? • What are the ways to measure the social and environmental outcomes of lean impact entrepreneurship, including the development of metrics and tools to track progress toward addressing societal grand challenges? • What role does emotional intelligence play in facilitating empathetic stakeholder engagement, and how can it be cultivated in researchers and practitioners? • How can virtual collaboration tools and online platforms be utilized to facilitate empathetic stakeholder validation, particularly in geographically dispersed or remote contexts? • What are the (dis)advantages of lean start-ups leveraging emerging technologies, such as artificial intelligence–driven chatbots or sentiment analysis tools, to engage stakeholders?

(continued)

Table 3 (continued)

Step in the Lean Impact Start-Up	Suggested Future Research Questions
Step 2a: Value creation	Mechanism: Integrating
	• What are the key factors that contribute to the success or failure of lean impact start-ups, and how can these factors be measured and optimized? • What are the most effective strategies for lean impact start-ups to mobilize and allocate the necessary resources, including funding, human capital, and technology, to achieve their social mission? • How can lean impact start-ups foster a supportive and entrepreneurial ecosystem that encourages experimentation, learning, and stakeholder engagement within integration initiatives? • What are the unique challenges lean impact entrepreneurs face in effectively pivoting and iterating their strategies based on stakeholder feedback and market dynamics? How to overcome such challenges? • What are the potential challenges and opportunities lean impact start-ups face when scaling up their initiatives across countries? • How can lean impact start-ups foster co-creation and collaboration with stakeholders, enabling them to become active participants in the value creation process? • How do the organizational culture, governance structures, and leadership styles impact the effectiveness of value creation for lean impact start-ups?
Step 2b: Value distribution	Mechanism: Balancing
	• What are the potential conflicts or trade-offs that organizations may face when striving to balance value distribution among stakeholders, and how can they be effectively managed? • What role do external factors, such as regulatory frameworks, social norms, and public expectations, play in shaping value distribution practices among stakeholders? • How can lean impact start-ups effectively navigate the legal and regulatory frameworks of different countries and regions, and what are the best practices for doing so in a way that is ethical and responsible? • How can lean impact start-ups effectively address the ethical and social implications of their solutions, including issues of power, equity, and justice, and what are the best practices for doing so in a way that is inclusive and respectful of diverse perspectives? • How does the perception of fairness in value distribution impact stakeholders' attitudes, behaviors, and long-term relationships with lean impact start-ups? • What are the roles of lean impact entrepreneurship in driving institutional change, such as influencing policy and regulatory frameworks to support sustainability and social justice? • How effective is the lean impact start-up framework in achieving positive societal change, and how does it compare with other social entrepreneurship models? • What are the potential spillover effects and broader societal impacts that can result from successful lean impact start-ups? • How can lean impact start-ups effectively collaborate with other stakeholders, including government agencies, nonprofit organizations, and private sector actors, to achieve collective impact and scale their solutions? • What are the key factors and considerations that influence value distribution decisions among stakeholders in different industries or sectors? • What are the scenarios in which the entrenched institutional norms and the scale of the grand challenge at hand might render an entrepreneurial approach ineffective or unfeasible?

are also encouraged to study mechanisms for lean impact start-ups to support the cross-border pooling of funds, expertise, and infrastructure, enabling more substantial coordinated efforts to tackle societal grand challenges at scale. Another promising research direction in this regard is to investigate the role of digital technologies in supporting stakeholder interaction and collaboration (Popkova, De Bernardi, Tyurina, & Sergi, 2022; Wang, 2023). For instance, scholars can explore how lean impact start-ups foster co-creation and collaboration with stakeholders through digital technologies, enabling them to become active participants in the value creation process. Specifically, studies could investigate the benefits and limitations of utilizing data-driven approaches, such as blockchain, artificial intelligence, and the internet of things, by integrating qualitative and quantitative research approaches.

Finally, with regard to the third mechanism, balancing, it will be fruitful for future studies to uncover novel ways for lean impact start-ups to distribute value effectively and equitably. It is important to note that when tackling global grand challenges, lean impact start-ups might need to gather resources to counter existing institutional norms while facing opposition from stakeholders who prefer to maintain the status quo (Mair & Marti, 2009). Another potential research direction is to investigate how lean impact entrepreneurs, together with global stakeholders, can amplify their voices and advocate for policy changes at the national, regional, and international levels. This would contribute a more nuanced, context-sensitive understanding of the interplay between start-ups and institutions (Zahra, Ireland, & Hitt, 2000) and the role of lean impact entrepreneurship. It is also crucial to consider potential unintended consequences or risks associated with lean impact start-ups. In particular, future research is encouraged to study ethical dilemmas that may arise in situations of conflicting priorities and how lean impact entrepreneurs can navigate these challenges responsibly while maximizing impact.

Conclusion

Organizations face significant obstacles to developing innovations that address societal grand challenges. By integrating lean start-up principles with insights from new stakeholder theory and stakeholder governance, we propose the lean impact start-up framework as an experimentation-based approach involving a wide array of primary stakeholders in a concerted effort to search for, create, and distribute innovative solutions to societal grand challenges. Specifically, the process we set forth involves three steps—value search, value creation, and value distribution—for each of which we propose a key underlying mechanism—empathizing, integrating, and balancing, respectively. Our lean impact start-up framework builds on the conventional lean start-up approach to answer the call for problem-oriented, impact-focused approaches based on pragmatism to solve societal grand challenges. We hope that our suggestions for future research will inspire scholars to delve more deeply into the unique challenges and opportunities that lean impact start-ups present. By making an academic theory more practitioner-friendly and extending the application of the lean start-up approach to a new setting, we hope to foster mutually beneficial two-way exchanges between academic theory and real-world practice. This, we believe, can accelerate the development of innovative solutions to the grand challenges that our society currently faces.

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Notes

1. Our article mainly focuses on start-ups. Yet the insights our approach yields also apply to entrepreneurial activity in large organizations, that is, corporate entrepreneurship, or intrapreneurship. We use the term "entrepreneurs" generically in a way that encompasses corporate entrepreneurs who act within established organizations.
2. Steve Blank's website provides further information on this issue, available at https://steveblank.com/2019/05/07/how-to-stop-playing-target-market-roulette-a-new-addition-to-the-lean-toolset/.
3. These are the first and third stages in what Bacq and Aguilera (2022) describe as value allocation, which consists of creation, appropriation, and distribution. In this article we do not deal with value appropriation, since it applies to stakeholders who can affect the success (or failure) of an organization because of their power (coercive or utilitarian)—for example, competitors—which is less directly relevant to our argument of creating and delivering value to intended beneficiaries of such value.
4. See https://www.mural.co/blog/stakeholder-mapping#:~:text=Stakeholder%20mapping%20is%20the%20process,throughout%20the%20product%20development%20process.

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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; Murrary & 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

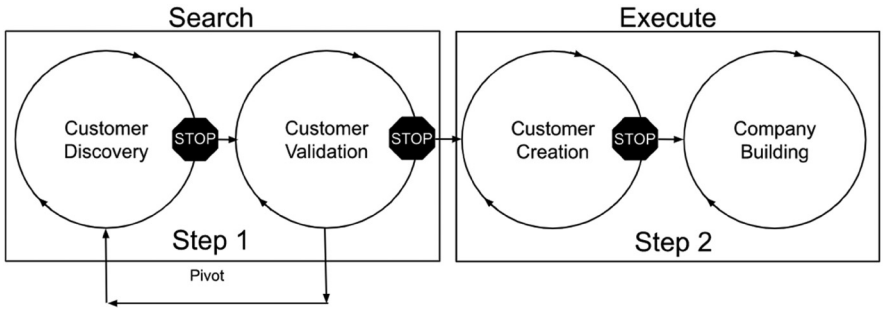
The Lean Startup begins with the premise that, at inception, most startups are best conceived as a bundle of untested ideas and assumptions about a business model. The goal is to transform these ideas from unknowns to knowns such that the startup can then turn activities into profits. Ultimately, the 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 execution[1] (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.

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Lean Start-Up in Settings of Impoverishment: The Implications of the Context for Theory

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We examine the application of "lean start-up" in impoverished non-Western contexts. Specifically, we focus on settings of impoverishment in which individuals earn less than $3.65 per day. We focus on how two attributes of these contexts—institutional differences relative to mature economies and resource constraints—affect entrepreneurs' implementation of lean start-up principles. By focusing our conversation on five components of lean start-up (search for opportunities, business modeling, validated learning, minimum viable products, and the decision to persevere/pivot), we describe how the conditions faced by impoverished entrepreneurs outside the West in impoverished settings present hurdles to some practices of lean start-up while encouraging other practices. We also offer ways entrepreneurs can adapt lean start-up to fit the conditions they face. In addition to advancing our understanding of lean start-up, this article also joins recent work that has critiqued the Western orientation of many management theories and practices and especially their application to people outside the West, where assumptions may not carry over due to institutional differences and resource constraints.

Keywords: *entrepreneurship theory; entrepreneurial/new venture strategy; developing countries*

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Lean start-up is a concept that draws from a book written in 2011 by Eric Ries, who describes it as an "application of the scientific method to entrepreneurship" (Blank & Eckhardt, 2023: 1). The potential of lean start-up in boosting entrepreneurs' performance and advancing the theoretical understanding of entrepreneurship (Camuffo, Cordova, Gambardella, & Spina, 2020; Contigiani & Young-Hyman, 2022; Harms & Schwery, 2020) has led to its broad adoption by business educators and public and private organizations in pursuit of innovation (Shepherd & Gruber, 2021). Entrepreneurs who deploy lean start-up emphasize the concepts of experimentation, the acquisition of customer feedback, adaptation, and rapid prototyping (Blank, 2013; Bocken & Snihur, 2020) as an alternative to lengthier planning and development processes (Mansoori & Lackeus, 2020). Lean start-up continues to grow in popularity, and it has also begun to receive more critical attention from scholars related to assumptions and boundary conditions within which the method applies (i.e., Felin, Gambardella, Stern, & Zenger, 2020; Leatherbee & Katila, 2020). However, lean start-up research remains largely contextualized within a set of Western assumptions appropriate for mature economies, as does most management scholarship, which means entrepreneurs might not be able to apply the proscriptions of lean start-up outside Western institutional contexts with abundant resources (Filatotchev, Ireland, & Stahl, 2022). Given recognition that theories might benefit from recontextualization outside Western mature economies (i.e., Bruton, Zahra, Van de Ven, & Hitt, 2022; Newbert, Kher, & Yang, 2022), we focus on the implications inherent in impoverished non-Western contexts for lean start-up and how entrepreneurs in these contexts might adapt lean start-up to successfully develop businesses.

In 2022, 23% of the world's population lived in poverty, earning less than $3.65 per day (Schoch, Baah, Lakner, & Friedman, 2022), and virtually none of this population lived in North America or Europe. We focus on two characteristics of highly impoverished non-Western contexts noted in research—institutional differences and resource constraints (Bruton, Ketchen, & Ireland, 2013; Bruton, Sutter, & Lenz, 2021; Gao, Zuzul, Jones, & Khanna, 2017; Sutter, Bruton, & Chen, 2019)—and describe how these characteristics may affect entrepreneurs' use of lean start-up.[1] Institutional differences between Western and non-Western settings often mean that non-Western economies do not have established institutions that support market transactions, such as functioning capital markets, legal systems, and property rights (Webb, Khoury, & Hitt, 2020). Resource constraints, particularly, entrepreneurs' lack of financial capital, exacerbate the risks entrepreneurs bear in settings of impoverishment (Hota, Mitra, & Qureshi, 2019), which can hamper entrepreneurs' ability to engage in the kinds of deliberate experimentation and adaptation described by lean start-up.

This article provides two contributions. First, we explore how impoverished entrepreneurs in non-Western contexts can widely practice (or not) lean start-up principles, and we suggest adaptations to lean start-up principles to better accommodate the institutional and resource conditions that these entrepreneurs face. In so doing, we argue that impoverished entrepreneurs often rely on lean start-up practices, to a degree, and that possibilities exist to further adapt lean start-up to address the challenges entrepreneurs face in these contexts. Second, we contribute to research that has encouraged a greater contextualization of management theories and practices in non-Western contexts (Newbert et al., 2022; Verwaal, Klein, & La Falce, 2022).

Lean Start-Up Method

The lean start-up method outlines a set of practices related to the start-up creation process that emphasize experimentation, entrepreneurs' early and frequent reliance on customer

feedback to acquire validated learning, adaptation, and the rapid development of prototypes (Ries, 2011). Lean start-up also helps entrepreneurs identify market opportunities to pursue on the basis of market conditions and entrepreneurs' strengths (Gruber, MacMillan, & Thompson, 2008, 2012). In describing lean start-up practices and explaining how impoverishment may influence how non-Western entrepreneurs enact lean start-up, we rely on the work of Shepherd and Gruber (2021), who highlighted as practices of lean start-up (a) the search for opportunities, (b) business modeling, (c) validated learning, (d) the use of minimum viable products (MVP), and (e) the decision to persevere or pivot. Next, we briefly discuss how entrepreneurs in mature Western economies understand and employ each element.

The Search for Opportunities

The Market Opportunity Navigator is a tool in lean start-up that enables entrepreneurs to evaluate a range of potential opportunities based on the desirability and difficulty of exploitation (Gruber & Tal, 2017). Opportunities emerge from specific markets, industries, technologies, and resource providers, and entrepreneurs who target infeasible opportunities experience reduced performance or costly adaptations if they target new opportunities (Blank, 2019; Gruber, MacMillan, & Thompson, 2013). Alternatively, entrepreneurs who can uncover and evaluate a range of opportunities before dedicating resources to building a start-up might be able to mitigate uncertainty, learn about customer needs more fully and more quickly, and adjust their resource deployments more effectively (Shepherd & Gruber, 2021). Entrepreneurs can also use the Market Opportunity Navigator to evaluate the potential of opportunities they uncover during the start-up process and whether they need to make adjustments or pivots (Gruber & Tal, 2017).

Business Modeling

Business modeling is a tool that entrepreneurs use to transform implicit assumptions about their businesses into explicit assumptions (Leatherbee & Kitila, 2020). The Business Model Canvas, a popular template used in lean start-up (Osterwalder & Pigneur, 2010), describes the various dimensions by which businesses create and capture value, including firms' value propositions, customer relationships, channels, and key activities. Business modeling helps entrepreneurs develop a cohesive theory of their business ideas and formulate hypotheses that they can use to test their ideas with customers. Because business models provide a simple and tangible representation of a business, entrepreneurs can devise business models that allow them to emphasize the key component of the business (Sarooghi, Sunny, Hornsby, & Fernhaber, 2019; You, 2022). Scholars have also noted, however, potential drawbacks in that business modeling produces a simplified understanding of the businesses and does not take into account external competitive dynamics facing a start-up (Becker & Brocker, 2021). Additionally, business modeling may lead to excessive testing and iteration, which can ultimately harm start-up performance (Ladd, 2016).

Validated Learning

Equipped with hypotheses derived from a business model, the next common lean start-up practice is validated learning. Entrepreneurs employ the practice to interact with potential or

early customers to understand their problems, obtain feedback on their businesses, and validate their assumptions (Blank, 2013). Through interactions with customers, the entrepreneur tests hypotheses and learns enough to turn their assumptions into verified facts (Blank & Dorf, 2012). Frequent, intensive interactions with customers and constant efforts to understand customer needs and behaviors are strong themes in lean start-up. In a lecture video, Blank (2020) encourages entrepreneurs to aggressively pursue customer feedback, saying that "in almost every country in the world now, entrepreneurs almost have a special pass of being crazy. . . . If you're breaking some cultural norm, just remind them you're an entrepreneur." In another video, Blank stresses being aggressive in gathering data from customers: "One of the other things you ought to think about, before you leave the building, is whether you can make bail. . . . In customer discovery, founders need to be aggressive, at least in the U.S." (Blank, 2012).

MVP

Lean start-up encourages entrepreneurs to frequently iterate their products and services based on their changing understanding of their customers' needs through validated learning (Blank, 2013). Opposed to longer, labor- and capital-intensive development cycles, lean start-up urges entrepreneurs to launch their products quickly as a tool to learn about customers (Ghezzi & Cavallo, 2020). A key practice that flows from this principle is the use of MVPs to test hypotheses. Instead of using fully developed beta tests with products that have received significant development attention, lean start-up encourages entrepreneurs to devote a "minimum amount of effort" to produce the sketch of an idea or the simplest possible solution to customers' problems (Ries, 2011). The MVP is the version of a new product that allows a team to collect the maximum amount of validated learning about customers with the least effort, enabling entrepreneurs to test hypotheses quickly.

Persevering/Pivoting

Through validated learning and the use of MVPs, entrepreneurs come to discover how to reach customers and understand what they want (Ries, 2009). When customer feedback validates entrepreneurs' assumptions, they might gain the confidence to persevere in their pursuits. Other times, when customer feedback suggests that an assumption of the business model might be invalid, entrepreneurs may consider pivoting, which is an "especially radical type of organizational change" (Hampel, Tracey, & Weber, 2020; Ries, 2011). A pivot represents an action greater than the incremental development obtained through validated learning (Shepherd & Gruber, 2021) and occurs when entrepreneurs make fundamental changes to their business model (Ries, 2011). Given the scale of change implied in a pivot, entrepreneurs can resist making them due to sunk costs or other personal biases (Burnell, Stevenson, & Fisher, 2023).

Overview of Lean Start-Up

Lean start-up offers an alternative to the traditional planning-heavy entrepreneurial approach often taught in business schools and utilized by many companies. As Blank

(2013: 5) notes, "Business plans rarely survive first contact with customers." Therefore, entrepreneurs who invest significant resources into business product or service development without first speaking with customers and learning about their needs can ultimately lose these investments. Another key difference between the classic planning-heavy approach and lean start-up lies in the understanding of a start-up's purpose. In the classic view, according to Blank, start-ups are small versions of large companies, and they aim to successfully execute plans. In lean start-up, the purpose of a start-up is to search for customer needs, a product or service that meets those needs, and a scalable business (Blank, 2013). Overall, studies have shown that the tools from lean start-up are very useful to entrepreneurs in mature economies since they help them avoid costly failures and excessive sunk costs (Camuffo et al., 2020).

Settings of Poverty

As noted earlier, we focus on the 23% of the world's population whose income is $3.65 per day who live outside developed Western contexts (Schoch et al., 2022), where entrepreneurs and their customers experience extreme poverty and limited financial resources. The $3.65 level includes both those living close to starvation and those still severely resource constrained in their entrepreneurship efforts but not necessarily confronted with a daily struggle for survival. The populations at this level of poverty are not evenly distributed across the globe but instead concentrated in sub-Saharan Africa and East Asia (Pakistan, India, Bangladesh, Nepal). A high proportion of people living in sub-Saharan Africa falls under the $3.65 threshold. Even in an economically developed nation like South Africa, approximately 40% of the population lives on less than $3.65 per day, while the same is true of about 83% of the population of Mozambique (Oxford University, 2023). This level of impoverishment is almost nonexistent in North America and Europe. For instance, approximately 1% of the population in the United States and about 0.25% of the population in Germany experience this level of poverty (Oxford University, 2023). Therefore, scholars from North America and Europe who study these contexts are almost always encountering a phenomenon that they have not personally experienced or witnessed in depth. As a result, scholars often lack the contextual understanding of such settings and, when applying concepts like lean start-up, may not adapt their arguments to fit settings outside developed Western contexts.

We focus on how characteristics common to impoverished non-Western contexts—institutional differences and resource constraints—might affect and require the adaptation of lean start-up. Institutional differences found in contexts of impoverishment result in inefficient market transactions, and they consist of both formal differences and informal differences (Khanna & Palepu, 1997; Webb, Khoury, & Hitt, 2020). In practical terms, formal institutional differences that characterize settings of impoverishment commonly consist of weak property rights, arbitrary court or police actions, and the lack of developed and dependable infrastructure, such as roads, electricity, and water (Khoury & Prasad, 2016; Mair & Marti, 2009; Pryor, Zahra, & Bruton, 2023). Informal institutional differences in such settings can have severe impacts on specific groups, such as women, when a setting prohibits women from owning property, transacting with men, or conducting business outside the home (Cleaver, 2005). Also, informal institutional differences, relative to Western contexts, can include the influence of tribes or clans that promote doing business only within that tribe

or clan (Webb et al., 2020). Similarly, businesses in such settings also place a strong emphasis on community because entrepreneurs need to rely more extensively on other actors in their community to overcome the challenges that arise from weaker formal institutions (Peredo & Chrisman, 2006). Their communities can include families, religious and tribal figures, and even suppliers and competitors (Bruton, Khavul, Siegel, & Wright, 2015; Mitchell, Wu, Bruton, & Gautam, 2022). Community members can provide information, supplies, financial support, and family support, and this support tends to be a mutual exchange (Bhuiyan & Ivlevs, 2019). As a result, a spirit of cooperation, rather than a Western emphasis on competition, often predominates within impoverished communities.

The second key characteristic of impoverished non-Western contexts is resource constraints. People who live on $3.65 per day or less have up to about $1,333 a year to survive. The scarcity of financial resources in these contexts drives entrepreneurs to rely on low-risk behaviors and pursue low-risk businesses (Julian & Ofori-Dankwa, 2013; Linna, 2013). In addition to supporting their businesses, entrepreneurs must also purchase goods, support households, and educate their children; thus, business failure can have broad, harmful consequences for entrepreneurs and those who depend upon them (Amankwah-Amoah, Boso, & Antwi-Agyei, 2018). Resource constraints also affect entrepreneurs' customers, who are often driven by subsistence-related needs (Martin & Hill, 2012). Scholars have noted the difficulty of introducing innovative products to such customers, given the unfamiliarity they might have with an innovation, inability to understand how an innovation may benefit them, and deficiencies in human capital or information sources to understand an innovation (Nakata & Weidner, 2012). For entrepreneurs, introducing innovative products may not be fruitful, given customers' unwillingness to pay (e.g., Wanyama, Godecke, Jager, & Qaim, 2019). As a consequence, in non-Western contexts, impoverished entrepreneurs serving impoverished consumers often avoid innovative products and rely on imitation as a way to reduce customers' uncertainty (e.g., Peprah, Giachetti, Larsen, & Rajwani, 2022).

Lean Start-Up in Settings of Poverty

In this section, we explore how institutional differences and resource constraints in settings of impoverishment in non-Western contexts affect the usefulness of lean start-up practices and how entrepreneurs might adapt these practices. We will in turn initially discuss the five aspects of lean start-up and how the setting of impoverishment impacts that aspect of lean start-up. Immediately following the discussion of each lean start-up practice, we will show how that aspect of lean start-up might be adapted for settings of impoverishment. Table 1 provides a summary of this discussion.

The Search for Opportunities

Institutional differences in impoverished non-Western settings raise a number of challenges for entrepreneurs searching for and evaluating opportunities. Generally, entrepreneurs' possession of unique information about customer demands and means for addressing those demands enables them to recognize opportunities (Lanivich et al., 2022; Vaghely & Julien, 2010). However, search costs, including the time and resources people spend to understand

Table 1
Summary of the Effects of Institutional Differences and Resource Constraints: Lean Start-Up Adaptations

Lean Start-Up Practices	Key Institutional or Resource Impediments	Outcome	Adaptation
Search for opportunities	• High search costs • Poor infrastructure • Underdeveloped educational systems • Financial constraints drive need for revenue	• Difficult for entrepreneurs to search for market-related information • Homogeneous customer demands • Lack of human capital to discover and evaluate opportunities • Urgency to exploit opportunities	• Reliance on locally available information • Use family members to test alternatives, such as market location or times of operation
Business modeling	• Financial constraints drive need for low-risk revenue generation	• Development of imitative business models	• Observation of local entrepreneurs • Incremental tests with familiar product offerings
Validated learning	• Socially disadvantaged groups (i.e., gender-, clan-, and ethnicity-based limitations to operating a business) • Financial constraints limit entrepreneurs' willingness to conduct extensive testing	• Narrower scope of information available • Hesitation to test options that might be unfamiliar to customers	• Develop business models and products that are desired by entrepreneurs' identity group, which makes information gathered from group members relevant • Conduct low-risk tests based on well-understood needs of existing customers
Minimum viable products (MVP)	• Underdeveloped financial markets restrict capital available for financing extensive development • Underdeveloped educational systems • Financial constraints limit extensiveness of product testing	• Entrepreneurs rely on MVP as primary product offering	• Reliance on bricolage, or means at hand, to develop products customers want
Persevering/ pivoting	• Social pressures that discourage failure • Stigma • Financial resources committed to a business may not be recoverable in the event of a pivot	• Reluctance to pivot	• Entrepreneurs may shift alternative resources (i.e., labor) to other income-generating activities in the household. These alternative activities may generate additional revenue, which entrepreneurs can use to adjust or pivot

market conditions, represent a hurdle in impoverished non-Western contexts as entrepreneurs seek to obtain information about customer demands (Aker & Mbiti, 2010). For example, unlike in mature Western economies, impoverished entrepreneurs in non-Western settings often cannot access rich sets of web-based information on existing businesses, market analyses of consumer demands, competitors' pricing, or other kinds of information that may enable them to discover gaps in the market. The resulting higher search costs, along with undependable infrastructure that makes travel difficult, can lead to high homogeneity of entrepreneurs' offerings and consumer demands, as entrepreneurs and consumers rely on existing, known solutions rather than innovative solutions. The lack of educational infrastructure, common in these contexts, can further hamper entrepreneurs' ability to discover and evaluate opportunities (Brixiova, Ncube, & Bicaba, 2015). Resource constraints may, in turn, force entrepreneurs to rapidly exploit the opportunities they identify due to the urgent need for revenue. Therefore, resource-constrained entrepreneurs often limit their exploration of alternative opportunities and select the most immediate option.

Adaptation for impoverished non-Western contexts. Despite these challenges, entrepreneurs in impoverished non-Western contexts may be able to successfully rely on lean start-up tools, such as the Market Opportunity Navigator, and adapt them to their needs. Thus, despite high search costs and homogeneous market conditions where entrepreneurs largely sell the same products as their competitors, entrepreneurs can rely on locally available information to find opportunities related to varying their locations in markets or the times they sell in the markets. Although conducting simultaneous product or market tests may be difficult, especially if entrepreneurs are simultaneously operating a small business, such as a stall or stand in a market, entrepreneurs may be able to ascertain the viability of time or location variations by using their family members or children to test-operate temporary outposts throughout a market or markets at different times of day. Entrepreneurs in these contexts frequently deploy such practices (e.g., Koomson & Asongu, 2016), which enable them to conduct, to a limited extent, market opportunity exploration.

Business Modeling

Resource constraints constitute a key obstacle for entrepreneurs in impoverished non-Western contexts to the practice of business modeling as conceptualized in lean start-up. In lean start-up, business modeling implies the development of innovative forms of value creation and capture (Ghezzi & Cavallo, 2020; Shepherd & Gruber, 2021) and frequent experimentation (Blank & Dorf, 2012; Osterwalder & Euchner, 2019). However, in impoverished non-Western contexts, entrepreneurs more frequently rely on imitative business models to achieve greater performance (e.g., Adomako, Amankwah-Amoah, & Ahsan, 2023; Peprah et al., 2022). This imitation is the result of resource constraints that push the entrepreneur to generate revenue quickly, thus lowering their risk. Customers' resource constraints, too, limit the extent to which entrepreneurs in these contexts may attempt business model innovation, as customers are reluctant to pay for innovative products and tend to focus on the basic needs of their daily life.

Adaptation for impoverished non-Western contexts. Given that imitative business models are often more appropriate in conditions of severe resource constraints, entrepreneurs may engage in practices to rapidly align their business models with similar businesses. In these contexts, entrepreneurs frequently are in large markets, where there may be hundreds of other vendors selling similar products. For example, in the Kantamano market in Accra, Ghana, more than 1,000 vendors sell used clothing. Entrepreneurs looking to enter this market may easily observe the practices of their neighbors and determine how much to charge for clothing, given that these transactions take place in open-air markets. Entrepreneurs can also observe how customers interact with other vendors, which can help them adjust their product offerings for that day or for individual customers who frequent the markets. However, in conditions like these, entrepreneurs may be able to practice very incremental business model innovations by observing the deliberate and inadvertent trials and successes of other vendors in the market. Given the volume of customers that pass through these markets, entrepreneurs may (or may not) rapidly validate trials, and observant entrepreneurs might find success in adopting successful variations.

Validated Learning

Institutional differences in impoverished non-Western contexts, such as those that favor one group of people over another or that disadvantage certain people, like women (Webb et al., 2020), make the kind of aggressive validated learning advocated by lean start-up more challenging. In some circumstances, women or members of a particular tribe or clan are unable to interact openly with others who can help them validate a product idea or a business model (e.g., Amine & Staub, 2009). In these cases, the scope of information entrepreneurs can obtain is significantly narrower than for entrepreneurs in conditions relatively unmarked by such social norms. Resource constraints might lead entrepreneurs to forego extensive validated learning before attempting to generate revenue. Additionally, the sort of scientific hypothesis testing advocated in lean start-up (Shepherd & Gruber, 2021), which leads entrepreneurs to validate the truthfulness of assumptions, might be limited in impoverished non-Western settings, where entrepreneurs are more comfortable selling what works than testing an alternative that might not work and might also alienate innovation-resistant customers.

Adaptation for impoverished non-Western context. Prior research has found that, in impoverished non-Western contexts, women and other disadvantaged groups rely on each other as business partners or on family members to support their business operations (Khavul, Bruton, & Wood, 2009; Pryor, Bruton, & Zahra, 2019). Therefore, entrepreneurs disadvantaged in these contexts can rely on their kinship networks to validate their ideas concerning products or business models. Although this approach might constrain the amount of information they obtain (Khavul et al., 2009), such feedback can be useful given that women-led businesses in these contexts tend to rely more deeply on their networks of family and friends (Ngoasong & Kimbu, 2019; Xeneti, Thapa-Kharki, & Madden, 2018). Additionally, in lieu of expensive experimentation, these entrepreneurs may practice frequent and low-cost adjustments based on their day-to-day interactions with customers. For instance, a clothing entrepreneur in the Kantamano market who sells sports jerseys might use revenue generated by the business to purchase related inventory, such

as athletic shoes, because of an assumption that their customers might buy the related product. Entrepreneurs who have become familiar with their regular customers can even text customers to let them know shoes are available. By taking such iterative, low-risk approaches and focusing on the information validated by the interactions with customers, entrepreneurs can experiment and successfully develop business models.

MVP

Institutional differences, such as those that have fostered underdeveloped financial markets and educational infrastructure in impoverished economies, make it challenging to develop innovative products in impoverished non-Western contexts because entrepreneurs encounter difficulties in financing product development, and lower human capital levels make it harder for entrepreneurs to innovate and for customers to understand the benefits of innovation (Castellacci, 2015; Danquah & Amankwah-Amoah, 2017). The resource constraints entrepreneurs face in these contexts can also reduce the scope of innovation possible (Woschke, Haase, & Kratzer, 2017). Entrepreneurs rely on MVP to evaluate market demand in lieu of engaging in longer and more resource-intensive product development cycles, which may result in offering products that customers do not buy (Ries, 2011). Therefore, the use of MVPs suits impoverished non-Western entrepreneurs, given the institutional and resource hurdles they face.

Adaptation for impoverished non-Western context. Extensive research on innovation in developing economies and among impoverished entrepreneurs has found evidence that entrepreneurs rely on bricolage, which involves "making do by applying combinations of the resources" (Baker & Nelson, 2005: 333). Using means at hand helps entrepreneurs overcome the lack of financial availability to support extensive product development (Yu, Li, Su, Tao, Nguyen, & Xia, 2020), and while human capital and personal resource constraints can limit the extensiveness of entrepreneurs' innovation, relying on means at hand can also increase the familiarity of products for customers, which can help entrepreneurs overcome information asymmetries (e.g., Da Silveira, 2001; Magruder, 2018). When contrasting the use of MVP in developed settings, where practitioners might assume large differences exist between products' minimal and final developed states, these differences are, themselves, likely to be minimal in impoverished contexts as a consequence of using bricolage. The adaptation by the clothing entrepreneur in Ghana who began to sell athletic shoes to complement their existing products might constitute an MVP, by which the entrepreneur gleans information about their customer while also generating needed revenue. However, the degree to which the entrepreneur might iterate beyond this minimum level is uncertain.

Persevering/Pivoting

Institutional differences, particularly, weak formal institutions, which increase the importance of community relationships, constitute serious challenges for pivoting. Pivots, insofar as they represent major changes to entrepreneurs' business models and product offerings (Ries, 2011), occur when entrepreneurs fail to validate their assumptions regarding customers. In

impoverished non-Western contexts, communities will likely perceive pivots as failures and even wasteful of community resources and support (Khavul et al., 2009). Therefore, the abandonment of a business is traumatic for entrepreneurs and their families, which often leads such entrepreneurs to continue to adhere to their existing businesses (e.g., Ukaegbu, 2003) lest they experience debilitating stigma (Amankwah-Amoah, 2018). Resource constraints, too, limit entrepreneurs' ability to pivot. For instance, a clothing seller in the Kantamano market who had been successfully selling used women's apparel finds that, with the recent introduction of cheaply made new women's apparel, customers are less desirous of their goods. This entrepreneur has made significant investments in an inventory they can no longer reliably sell to customers. Pivoting to new women's clothing is difficult, given their current inventory investments and inability to purchase new goods. Therefore, these entrepreneurs often become trapped.

Adaptation for impoverished non-Western context. One practice common in impoverished non-Western contexts that can enable entrepreneurs to practice pivoting is income diversification of families' business efforts. Households in contexts with weak or unstable institutional environments, frequent political or environmental shocks, and underdeveloped labor markets will often attempt to diversify their income sources by involving family members in multiple income-generating activities (Reardon, Delgado, & Matlon, 1992; Wouterse & Taylor, 2008). Men or older children may provide goods and services in local markets, women may produce homemade goods for sale in markets or tend household plots of land, and younger children may provide smaller services, such as scavenging or providing labor to others in a community (Canagarajah & Nielsen, 2001; Perez, Bilsborrow, & Torres, 2015). This practice constitutes a form of indigenous real-options strategy, by which households mitigate risks related to any one income stream while also being able to reallocate resources to income streams that are more valuable, given changing local conditions. This practice may also enable a form of household-level pivoting: While an entrepreneur may be reluctant to make large changes to one business, given prior resource investments, they might be more willing to reallocate resources, especially their labor, to support more successful income-generating activities. Entrepreneurs may use the increased income derived from these alternative activities to, eventually, enhance their primary business in ways they could not otherwise afford.

Discussion

Lean start-up is both an important set of practical tools for entrepreneurs and an increasingly vibrant research stream (Shepherd & Gruber, 2021). Our article describes how conditions in impoverished non-Western contexts—in particular, institutional differences and resource constraints—can affect entrepreneurs' use of lean start-up practices. We also describe how, despite these conditions, entrepreneurs might adapt these practices to derive the most benefit in their circumstances. In this section, we will discuss the contributions and related future research directions concerning lean start-up and management theory and practice more broadly. We include additional research questions in Table 2, and we close with a discussion of the practical implications of this article.

Table 2
Research Questions Concerning Impoverished Entrepreneurs in Non-Western Contexts

Search for Opportunities
How do entrepreneurs come to understand the best products, locations, or times to sell within markets?
How does impoverishment affect the extensiveness of entrepreneurs' search for opportunities?
What are the challenges entrepreneurs face in evaluating the potential or challenge of opportunities, given higher search costs?
Business Modeling
What factors might influence the degree to which entrepreneurs attempt to imitate existing business models?
What factors lead entrepreneurs to experiment with unique business model configurations?
To what extent are entrepreneurs observing other market actors and replicating their business models?
Are there elements of the business model that entrepreneurs may be more willing to innovate (imitate), and why?
Validated Learning
What are the social norms that prevent entrepreneurs from aggressively pursuing validated learning?
How do entrepreneurs overcome their social disadvantages to obtain feedback related to their opportunity, minimum viable products (MVP), or business model?
Are entrepreneurs subject to social disadvantages more or less likely to develop imitative or innovative business models, and why?
MVP
What constitutes "minimum" for entrepreneurs' MVPs?
What factors determine the potential "maximum" of entrepreneurs' MVPs?
How might entrepreneurs overcome homogeneous customer preferences to introduce innovative products?
How might loosening entrepreneurs' resource constraints encourage them to pursue innovative products?
What tactics do entrepreneurs rely on to liken product innovations with well-known existing products?
Persevering/Pivoting
How does the diversity of household income facilitate entrepreneurs' ability to pivot their business?
What tactics do entrepreneurs use to avoid sunk costs?
What factors account for differences between entrepreneurs who successfully pivot and those who resist pivoting?
Why might some entrepreneurs, relative to others, be more sensitive to social sanction related to failure?
Under what circumstances might social actors perceive a pivot to be a successful outcome or a failure?
Institutional Differences
In contrast with developed Western contexts, what formal institutional differences might enable (hinder) entrepreneurs' practice of lean start-up?
In contrast with developed Western contexts, what informal institutional differences might enable (hinder) entrepreneurs' practice of lean start-up?
What challenges (advantages) do businesses indigenous to the West encounter when attempting to practice lean start-up in impoverished non-Western contexts?
What challenges (advantages) do entrepreneurs who have immigrated from impoverished non-Western contexts to developed Western contexts encounter when attempting to practice lean start-up?
Resource Constraints
How do entrepreneurs use resources at hand to overcome financial resource constraints to practice lean start-up?
How do resource constraints constrain (enable) entrepreneurs to develop creative solutions?

Contributions and Future Research Directions

Our article suggests that a number of differences exist between how entrepreneurs conceptualize and practice lean start-up in developed Western settings and how entrepreneurs conceive and practice it in impoverished non-Western settings. While research has presented lean start-up as a more effective and efficient means to produce innovative products and business

models, certain institutional differences exist outside the West that often render this objective infeasible for impoverished entrepreneurs. Increased search costs, for entrepreneurs and for their customers, along with infrastructure weaknesses, make the obtainment and diffusion of unique information more difficult, which can stymie entrepreneurs' search for opportunities and lead them to create imitative businesses and lead their customers to demand imitative products (Acs & Virgill, 2010). Nevertheless, these entrepreneurs likely have some choice available to them regarding "where to play," such as their locations in particular markets or the product categories they intend to enter. Research focusing on how impoverished non-Western entrepreneurs make these choices and the extent to which they might use factors captured by the Market Opportunity Navigator, such as the potential scale represented by an opportunity or the challenges related to pursuing an opportunity (Gruber & Tal, 2017), could lead to further insights. Additionally, institutional differences that create social disadvantages for certain populations present difficulties for entrepreneurs who use aggressive validated learning. While Blank (2012) acknowledges that entrepreneurs in the West might be so aggressive they could need bail money, the kinds of informal enforcement mechanisms that exist in certain non-Western impoverished contexts, such as social ostracism or worse (e.g., Hayami, 2009), limit the sources of information some entrepreneurs can gather. Conversely, research suggests that in some non-Western contexts, entrepreneurs already occupy outcast status, especially when forms of employment are available (e.g., Markowska & Abebe, 2021), which might free them to practice validated learning. Future research is necessary to further understand how the potential for ostracism or outcast status might shape the information sources or depth obtained by entrepreneurs in these contexts.

Lean start-up practice in the developed West and impoverished non-Western contexts may also share several similarities that warrant further scholarly exploration. Perhaps the most notable similarity is the reliance on MVPs in both contexts. We describe how both institutional differences and resource constraints can compel impoverished entrepreneurs to deploy MVPs; however, unlike entrepreneurs in the developed West, questions remain concerning the difference between the actual minimal and potential maximum product. While scholars in the West have called for further research into what constitutes "minimum" (e.g., Shepherd & Gruber, 2021), scholars from a non-Western orientation may also seek greater understanding related to what caps the maximum potential of impoverished entrepreneurs' end products. Second, impoverished entrepreneurs might possibly practice a form of validated learning unique to that in the West, given that many impoverished non-Western entrepreneurs conduct their business in close proximity to other entrepreneurs, who, very often, are selling imitative goods to the same customers in the same location. This possibility raises questions related to how entrepreneurs' market location (i.e., where to play) can facilitate vicarious learning (e.g., Foo, Vissa, & Wu, 2020).

We also intend for this work to join prior research that has called for a greater sensitivity in applying theories and practices derived in the West to non-Western contexts (e.g., Bothello et al., 2019; Bruton et al., 2018, 2022). We hope to encourage practitioners and scholars to examine other models developed in Western settings and seek to understand how those models work in settings where Western institutional assumptions do not necessarily apply. For instance, scholars in the West assume lean start-up is an effective and efficient methodology to innovative outcomes; however, to the extent that impoverished entrepreneurs outside the West practice lean start-up, it seems to be less about innovation and more about surviving

in fragile and resource-scarce environments. Other theoretical perspectives, too, may find that their foundations are radically different when applied to non-Western contexts, and we encourage researchers not just to embrace these differences but also to consider deriving theories based on the indigenous practices of vast swaths of the world that are only now attracting increasing scholarly attention.

Finally, we recognize that entrepreneurs in different settings may not experience poverty in the same way or that poverty will have the same effects on their business practices, given that institutions and the nature or resource constraints differ across societies. Among many other factors, colonial legacies, traditional social norms, migration patterns, the availability of environmental resources, civil strife, and the degree to which some populations experience disadvantages or oppression, can affect the institutional differences faced by entrepreneurs and the possibility for entrepreneurs to accumulate personal resources (e.g., Afolayan, 2001; Joireman, 2001; Namatovu, Dawa, Adewale, & Mulira, 2018; Ploeg, 2011). Additionally, impoverished non-Western entrepreneurs constitute almost the entirety of a population, while impoverished entrepreneurs in the West constitute a much smaller proportion of a population. Further research could help researchers understand how these differences might affect entrepreneurs' practices and how lean start-up might best be adapted to fit each unique context.

Practical Implications

Many of the efforts to encourage entrepreneurship among the impoverished to help address their poverty have failed (Kim & Kim, 2022). Even a widely promoted innovation in developing economies, microfinancing, has not significantly improved entrepreneurship outcomes (although it has improved people's nutrition; Chen, Chang, & Bruton, 2017). Thus, we encourage scholars not to view our work as a critique of impoverished non-Western contexts but rather as a set of descriptions grounded in reality. With that in mind, researchers can use this article to enhance entrepreneurial training in impoverished non-Western contexts. For instance, entrepreneurs could be trained to see their local markets as playing fields, in which they can deliberately test, very incrementally, new locations, products, and times of operation in order to better understand the most favorable market conditions. Additionally, for entrepreneurs who face social disadvantages due to their gender or ethnicity, rather than seeing these conditions as constraints, perhaps they could learn to see their gender or ethnic groups as potentially tight-knit user groups, which, from a certain perspective, constitute potential markets (cf. Shah & Tripsas, 2007).

Can the practices of the entrepreneurs we examine inform the lean start-up practices of entrepreneurs in the West? One possibility noted by scholars is that entrepreneurs in the West can pivot too much (Chen, Elfenbein, Posen, & Wang, 2022; Ladd, 2016) or that entrepreneurs may have picked up the jargon of lean start-up without understanding or practicing it (e.g., Seibel, 2020). In contrast, impoverished entrepreneurs, who are not aware they are practicing lean start-up principles but do so out of necessity, place a great emphasis on generating revenue quickly (similar to experienced entrepreneurs in the West; e.g., Baron & Ensley, 2006). Therefore, entrepreneurship educators in the West may consider incentivizing students to strive more strongly to make sales much earlier in the start-up process.

Conclusion

Researchers have recognized that businesses cannot ignore the problems of poverty (Tang, 2018). The practices that make up lean start-up have the potential to help impoverished entrepreneurs overcome the constraints of their contexts. Establishing a clear understanding of how entrepreneurs can best adapt lean start-up to the circumstances of impoverishment is important, yet unfinished, work. In the areas of the world in which people survive on less than $3.65 a day, entrepreneurship is often a necessity—operating a business is often the only means a person must support themselves and their families. Scholars can help both new and established businesses to be more successful and to help address the pressing issues of poverty that these individuals face. This goal requires consciously and purposefully contextualizing the theories we study in order to provide new knowledge that fits adequately to the challenges entrepreneurs face.

Note

1. The authors consciously use the term "institutional differences" rather than "institutional voids." The term "institutional voids" indicates an absence of institutions. However, our experience in settings of poverty is not an absence of institutions but the presence of alternative institutions that do not align with the expectations of scholars from mature Western contexts (Bothello, Nason, & Schnyder, 2019).

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Four Approaches to New Venture Creation: Taking Stock and Moving Forward

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Lean startup, effectuation, creation theory, and the theory-based view represent four different descriptive theories of how new ventures emerge and/or normative theories of how new ventures should be developed. We juxtapose the four approaches and describe their similarities and differences, which provides a foundation for considering complementarities among the approaches and constructing a future research agenda for additional reconciliation and contextualization regarding how successful new ventures are, or should be, developed under varying circumstances.

Keywords: *opportunity recognition; new venture creation; entrepreneurship; innovation and learning; MACRO*

Lean Startup offers a methodology that focuses on continuous, iterative learning and experimentation supported by a set of business tools designed to support entrepreneurs during this process. Arguably, this methodology is the most widely used toolset in entrepreneurship and innovation worldwide, profoundly shaping how practitioners, educators, and

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academics think about new venture creation. The first three special issue papers following Eckhardt and Blank's (2024) summary of Lean Startup, written by Sarasvathy; Alvarez, Barney, Arikan, and Arikan; and Felin, Gambardella, Novelli and Zenger, directly challenge the Lean Startup methodology by offering competing descriptions of how new ventures are or should be created. We therefore thought it appropriate to clarify similarities and differences between the Lean Startup and these alternatives and offer some thoughts about how they might be used in tandem or how different approaches might be preferred in different contexts and about how scholars can move forward from here.

While each set of authors describes their approach in their special-issue paper and in other publications (e.g., Alvarez & Barney, 2007; Sarasvathy, 2009; Wuebker, Zenger, & Felin, 2023), a direct comparison of approaches, including the Lean Startup, is lacking. Indeed, a careful reading of these three special issue papers shows that authors sometimes deemphasize elements of Lean Startup in their efforts to draw contrasts with their own work. To bring greater clarity and objectivity to the debate, we begin by summarizing our best interpretation of each approach. We then describe key dimensions upon which they differ, offer some thoughts about how the approaches might be viewed as complementary, and conclude with some unanswered questions that researchers might pursue to advance understanding of how entrepreneurs should best proceed under different conditions.

Four Approaches to New Venture Creation

Lean Startup. Eckhardt and Blank's (2024) description of Lean Startup is largely consistent with our interpretation. It is a normative theory wherein entrepreneurs start with an assessment of their resources and capabilities, which often includes a newly developed product, service, or technology. The *Where to Play* tools help entrepreneurs evaluate alternative markets where the entrepreneurs' resources and capabilities might be productively deployed (Gruber & Tal, 2017). Once a set of potential customers is selected, the business model canvas (BMC) is used to build a theoretical sketch of what a successful business might look like (Osterwalder & Pigneur, 2010). The business theory as described by the BMC includes a description of the proposed product or service, the customers the venture will target and the plan for reaching and relating to them, the value proposition (i.e., a description of why the entrepreneur thinks customers will want the product and/or service), the resources and partnerships necessary to deliver it, and a description of the financial model in terms of revenues and costs. Once the theory of the business is articulated, entrepreneurs "get out of the building" (Blank & Dorf, 2012) to talk to customers and other stakeholders (e.g., potential funders or suppliers) and run experiments (often using minimum viable products [MVPs]) to test the viability of each aspect of the BMC, starting with the most critical aspects of the theory that must be true. When collected data fails to support some aspect of the business model, the entrepreneur "pivots" by reimagining those aspects of the business model that did not receive support. When the unsupported elements are central to the business model (e.g., the value proposition), pivoting might involve returning to *Where to Play* to find a second-choice market where the entrepreneur's specific resources and capabilities might be successfully leveraged.

Creation Theory. Whereas the Lean Startup framework is decidedly normative, creation theory is descriptive in its attempt to explain how novel business ideas emerge (Alvarez & Barney, 2007; Alvarez, Barney, Arikan, & Arikan, 2024). Under the assumption of Knightian uncertainty, where neither customers nor entrepreneurs know what might work, people share their ideas with one another about what they believe is needed or what they would like to create. Some of these "conversational experiments" gain traction because they appeal to a group of people with real interest in the ideas. Successful new ventures are born when exciting and appealing conversations converge with people who, because of their unique (path-dependent) knowledge, social connections, and life experiences, are willing and able to take actions that create the opportunity described in the conversations (Alvarez et al., 2024).

In addition to being more descriptive than Lean Startup, creation theory operates at a different level of analysis and describes the emergence of only a subset of the most novel new ventures. Whereas Lean Startup describes what individual (and teams of) entrepreneurs should do, creation theory draws on evolutionary theory's variation, selection, and retention model (i.e., Nelson & Winter, 1982) to offer an economy-wide account of how uncertain environments select and retain successful new ventures that create previously unseen opportunities from a wide variety of potential ideas. It also differs from Lean Startup in that it focuses on explaining how highly novel business models involving new market categories come into being. While most conversational experiments fizzle out (perhaps after some investment), those that survive are often highly novel businesses that sometimes have significant social and economic impact. Lean Startup, in contrast, claims to be applicable for discovering both highly uncertain opportunities and small variations of previously successful business models (Blank & Dorf, 2012), though its efficacy in different contexts remains an empirical question.

Effectuation. As described by Sarasvathy (2001, 2024), effectuation is both descriptive and normative. It describes the behavior of experienced entrepreneurs who have learned through practice how to develop new ventures, and it is normative in that it offers principles that less experienced entrepreneurs can learn and apply. Rather than developing a theory of the business, effectuators simply take action based on what they have (i.e., bird-in-hand principle) by building a product or service, or just an idea, and talking to people (i.e., crazy quilt principle), changing direction when confronting inevitable road blocks (i.e., lemonade principle), and co-creating with anyone interested in committing resources (i.e., pilot-the-plane principle). All this is done while minimizing downside potential (i.e., affordable loss principle).

Effectuation is about control. It emphasizes taking actions using expendable resources under the entrepreneur's control. It deemphasizes the need to build a predictive theory of the business, even if such an exercise is done knowing that the theory is likely wrong as in Lean Startup. Without a predictive theory, the concept of pivoting doesn't make much sense; there isn't much to pivot from. Potential stakeholders might love and commit to the entrepreneur's initial idea, but more likely, the venture will change in unpredictable ways based on whom the entrepreneur talks to and what potential stakeholders are willing to commit to. Finally, unlike Lean Startup (and the theory-based view: Felin, Gambardella, Novelli, & Zenger, 2024), effectuation does not promise to increase the probability that any one effort will yield a scalable new venture. Many effectuation efforts fail. The promise instead is that through

effectuation, the entrepreneur increases the odds that one of their potentially many efforts will pay off; what that successful venture might look like is unpredictable *a priori*.

Theory-based view. The theory-based view is a relative newcomer, first articulated in 2017 (Felin & Zenger, 2017). In their special issue paper, Felin et al. (2024) focus on describing differences between the theory-based view and Lean Startup. Like Lean Startup, their view is normative and begins with a theory of the business. It also embraces data collection and experimentation. The similarities end there, however. Whereas the theory of the business in Lean Startup is relatively complete, addressing each box in the BMC, the theory in the theory-based view is centrally about what is contrarian. The entrepreneur must theorize something that does not exist and might appear surprising and contradict what is normative or thought possible. In a Knightian uncertain world where customers do not know what they want and other stakeholders do not know what customers might buy, the entrepreneur proceeds as if their theory is correct. They begin by articulating the theory's core assumptions and beliefs that must be proven true for the theory to be validated. Core assumptions present problems or sets of subproblems that must be solved to validate the theory. Solutions are identified and data are collected and/or experiments performed to assess the effectiveness of proposed solutions. When data from experiments reject the efficacy of one proposed solution, the entrepreneur searches for alternatives. Only when no viable solutions to core problems can be found do entrepreneurs abandon the theory and begin the theory-building process anew.

Like creation theory, the theory-based view restricts itself to the domain of Knightian uncertainty, where potential customers, funding sources, suppliers, and other stakeholders have no more useful information than do entrepreneurs. The difference is that rather than engaging in conversations to see what emerges (as in creation theory and effectuation), the entrepreneur assumes they know best and takes action to validate their contrarian theory, which makes the approach both prediction-oriented like Lean Startup and control-oriented like effectuation. As the process unfolds, the entrepreneur might identify and test different potential solutions to core problems and subproblems, but these changes do not meet the definition of a pivot (see Allen et al., 2024). Major changes in strategic direction (i.e., pivots) come only after the entrepreneur gives up on their theory and begins to formulate a new one. Although still an open empirical question, when solutions are found to core problems and the theory is validated, Felin et al. (2024) argue that their approach to new venture creation is more likely to generate novel breakthrough ventures that create significant economic value.

Differences Among Approaches

Table 1 summarizes core differences we identify among the approaches along the following dimensions: type of theory, place in the prediction-control space, assumptions about the environment, assumptions about entrepreneurs, new venture process, pivoting, and new venture success.

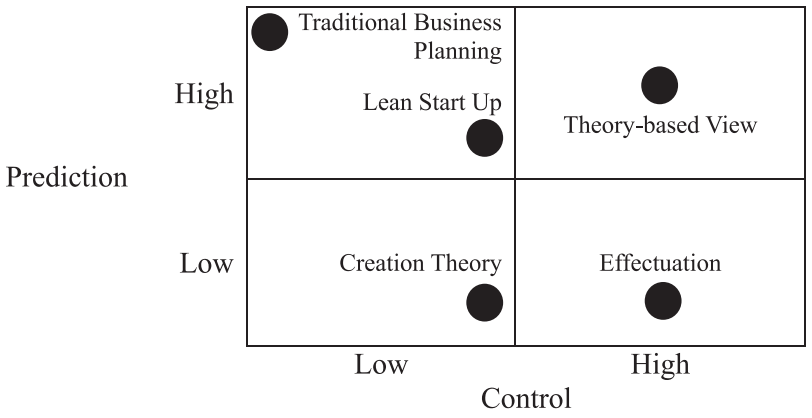
Type of theory. Creation theory stands apart with its focus on description. Alvarez et al. (2024) are less interested in telling entrepreneurs how to go about establishing successful new ventures than providing an academic explanation for how new ventures come into being.

Table 1
Differences Among Approaches

	Lean Startup	Effectuation	Creation Theory	Theory-based view
Type of Theory	Normative	Normative & descriptive of experienced entrepreneurs	Descriptive	Normative
Place in the Prediction-Control Space	Moderately high prediction, moderately low control	Low prediction, high control	Low prediction, moderately low control	High prediction, high control
Assumptions About the Environment	Information asymmetries between what customers want and what entrepreneurs know or think	None. Works under all conditions.	Knightian uncertainty makes prediction meaningless.	Knightian uncertainty makes one's generative theory the only thing to base actions on.
Assumptions About Entrepreneurs	Entrepreneurs are biased decision makers and boundedly rational information processors.	Entrepreneurs are action takers.	Small path dependent differences lead to large outcome differences.	Entrepreneurs are generative actors who create internally rational systems of thought.
New Venture Process	Convert theory to testable hypotheses and gather low-cost data. Use results to refine, revise, or reject the theory of the business	Create something affordable and talk to people. Find self-selected stakeholders who will commit to and co-create what they want/need.	Evolutionary process in which many variations of conversational experiments take place, but most are selected out.	Contrarian theory guides search for core obstacles. Its validity is established by hypothesizing and testing solutions.
Pivoting	When tests of some part of the BMC reveal that the business theory won't work as stated, especially product-market "fit"	When a stakeholder identifies something they want to do/have and are willing to commit resources	When nothing comes of a conversational experiment and a new conversation begins	When an (sub) problem necessary for proving the theory is unsolvable
New Venture Success	Success follows finding evidence of product-market fit supported by a business model (with its multiple elements) that generates revenues and profits in a repeatable manner.	No promise of a best path for any one effectuation effort, but repeated acts of effectuation increase the odds that one effort will succeed	Conversational experiments improve odds, but the environment selects and retains creations that resonate with stakeholders.	Success follows finding evidence that proposed solutions to problems posed by contrarian beliefs are effective.

Though they describe actions entrepreneurs can and probably should take to increase their odds of success, the primary causal mechanism is environmental. Entrepreneurs create under uncertainty; the environment selects and retains those creations that resonate with customers and interested stakeholders. While Sarasvathy's (2001) effectuation theory also describes the behavior of experienced entrepreneurs, it joins Lean Startup and the theory-based view in

Figure 1
The Four Theories of New Venture Creation in the Prediction-Control Matrix



Source: Our adaptation of Sarasvathy's (2024) adaptation (in her Figure 2) of Wiltbank et al. (2006).

offering normative actions all entrepreneurs can take to reduce the negative consequences of uncertainty and thereby improve chances for success.

Place in the prediction-control space. Sarasvathy's (2024) contribution to the Special Issue provides another important way to distinguish among the approaches. Drawing on Wiltbank, Dew, Read, and Sarasvathy (2006), she places several approaches to new venture development in a 2×2 matrix based on the approach's reliance on predicting what might work versus controlling what one has; we offer a modified version (of her Figure 2) as our Figure 1. We follow her lead by placing effectuation in the lower right-hand quadrant defined by high control and low prediction and placing Lean Startup in the upper left-hand quadrant depicting high prediction and low control. However, we placed Lean Startup in the lower-right corner of the high-prediction low-control quadrant because, by advocating talking to customers and other stakeholders, conducting experiments, and pivoting frequently, entrepreneurs applying the Lean Startup framework are action (or control) oriented and taught not to get too tied to their predictions (though it happens: see Grimes, 2018). Reading the special issue contributions by Alvarez et al., and Felin et al., we believe that they can also be usefully distinguished in Figure 1 by placing creation theory in the lower left-hand low control-low prediction quadrant and placing the theory-based view in the upper right-hand quadrant of high control and high prediction. As with Lean Startup, we place creation theory more toward the control side of the quadrant because it involves taking action through conversational experiments. Indeed, research shows that successful entrepreneurship involves taking action under risk and/or uncertainty (McMullen & Shepherd, 2006), leaving only the practice of constructing full business plans (far out) on the low-control side of Sarasvathy's (2024) framework. We placed the theory-based view in the middle of the high-prediction high-control quadrant because while it involves fewer predictions/hypotheses than Lean Startup or a traditional business plan, the (visionary) contrarian theory is a strong-form prediction that the entrepreneur attempts to prove through control-oriented action to identify obstacles, generate solutions, and establish their efficacy.

Assumptions about the environment. Creation theory and the theory-based view assume Knightian uncertainty, an extreme version of uncertainty where any predictions are irrelevant and where no information can be trusted as a basis for action. For creation theory, such uncertainty suggests engaging in conversations until a direction or set of actions starts to gain traction and uncertainty around select courses of action subsides. For the theory-based view, it means that entrepreneurs' theories are as good as anybody else's, so they should move forward with their own internally consistent theory. Effectuation appears agnostic to uncertainty. The principles should increase entrepreneurs' probability of success under both uncertainty and risk. Lean Startup accepts variation in uncertainty: introducing new products based on new technologies in new markets involves significant uncertainty; there is less uncertainty when new products are introduced to existing markets or existing products are carried over to new markets; and even less uncertainty, perhaps low enough to be called risk, exists when new variations of existing products are introduced to existing markets (Blank & Dorf, 2012; Gruber & Tal, 2017). However, grounded in the individual-opportunity nexus (ION) view that opportunities exist, at least in latent form (e.g., Shane, 2003; Shane & Venkataraman, 2000), Lean Startup assumes a less extreme version of uncertainty. Some useful information is assumed to exist, suggesting an information asymmetry between entrepreneurs and the environment that can be reduced to point entrepreneurs in potentially successful directions. Creation theory and the theory-based view are less confident about such an assertion.

Assumptions about entrepreneurs. Creation theory is agnostic about entrepreneurs, suggesting that small differences in path-dependent life-experiences can cause some people to create opportunities while others who start in a similar place or reside in a similar context fail to pursue, or unsuccessfully pursue, the creation process. For effectuation, taking entrepreneurial action while avoiding unaffordable loss is what defines an entrepreneur; an entrepreneur is someone who engages in effectuation. The theory-based view sees people as generative actors who maintain internally consistent theories of how the world works. Given Knightian uncertainty, entrepreneurs have *only* their theories of what is possible to guide action, leading to a view of entrepreneurs as visionaries who work to prove to others that their theory is right. Lean Startup, in contrast, focuses on bounded rationality in decision-making, especially under conditions of incomplete information, and uses fast and rough versions of scientific data collection methods and experimentation to improve decision-making. As in effectuation, an entrepreneur or innovator is anyone who takes action to reduce information asymmetries in pursuit of sustainable business models.

New Venture Process. Given their different purposes and assumptions, it should not be surprising that the four approaches advocate different processes for creating successful new ventures. Lean Startup and the theory-based view both start with a theory of the business, but the nature of the theory and the next steps are different. In Lean Startup, the theory is relatively complete as articulated in the BMC, and initial steps involve interviewing critical stakeholders about the viability of different aspects of the BMC, often by testing potential customers' response to a minimum viable product (MVP). The Lean Startup therefore places an important emphasis on the viability of the new venture under the assumption that the venture's revenue and profit generating ability is critical to survival. The theory in the theory-based view, in contrast, involves a less-complete theory of the business that focuses narrowly on those beliefs the entrepreneur has about a potential business that contradict and potentially

challenge what currently exists. Once the entrepreneur articulates a contrarian belief that must be true for the business theory to work, they set to work solving core problem(s) that challenge their beliefs. Data gathering and experiments revolve around testing whether proposed solutions resolve the core problems.

Rather than developing theoretical (and predictive) beliefs, effectuation and creation theories start with taking action. In the case of creation theory, the action is conversations, a few of which will resonate with people and spark efforts by would-be entrepreneurs who are uniquely poised because of their path-dependent experiences to create the opportunity described in the emerging conversation. As a normative theory, effectuation offers more concrete advice: make/sell something—anything—from what you have (bird-in-hand) without risking too much (affordable loss) and look for people who are interested in what you are doing (crazy quilt). If they don't like what you were doing, ask what they would be interested in (lemonade) and what they would commit to and work with you on (pilot the plane).

Pivoting. The different approaches offer different advice for when to change direction or "pivot." In creation theory and effectuation, changing direction is quick, constant, and natural as conversations fade and restart in creation theory and entrepreneurs co-create with self-selected committed stakeholders in effectuation. Pivoting is more systematic in Lean Startup and the theory-based view. In Lean Startup, the entrepreneur "pivots" when interviews and/or tests do not support the viability of key aspects of the BMC. Just like a basketball player who pivots on one stationary foot by changing direction with the other (Ries, 2011), some aspects of the business model remain (e.g., the entrepreneur's unique technology) but much of the BMC is reimagined and the testing process restarts (Allen et al., 2024). In the theory-based view, early and frequent change is common as the entrepreneur proposes and tests different solutions to core problems, but the big changes in strategic direction that define a pivot come only after the entrepreneur acknowledges that core challenges to their contrarian theory cannot be overcome with current technology. At this point, the entrepreneur pivots by imagining a new theory with new contrarian beliefs (Felin et al., 2024).

New Venture Success. Finally, the approaches differ in their predictions about new ventures success. Though it might involve multiple pivots and restarts, only Lean Startup promises a process designed to identify a sustainable business model, one that introduces a product or service that customers want and will pay for above production costs. Effectuation comes close to such a promise by suggesting that engaging and repeated acts of effectuation increases the probability that once such act will result in a successful new venture. Because of their assumptions about Knightian uncertainty, creation theory and the theory-based view require a bit of luck (cf. Barney, 1986). In the theory-based view, the entrepreneur's contrarian theory must ultimately prove correct in a context where no one knows for sure; conventional wisdom must be proven wrong. In those potentially rare cases where the entrepreneur is correct and conventional wisdom wrong, the theory-based view provides a roadmap for revealing the truth and overcoming doubts found in conventional wisdom. Creation theory similarly requires luck. The creator-entrepreneur must participate in a conversational experiment that gains momentum under conditions where it is unknowable *a priori* which among many conversations will do so. Then the entrepreneur needs to have the correct path-dependent life experiences and resulting capabilities and access to resources needed to create something that

is selected and retained by the environment. Others attempting to create similar products and services based on similar conversational experiments are unsuccessful because they lack the unique path-dependent life experiences necessary to precisely match what the environmental demands for retention, which is also unknowable *a priori*.

Complementarities Among Approaches

Reading the first four papers of the special issue and our description of their different assumptions and approaches might lead one to the conclusion that there are (at least) four irreconcilable approaches to starting new ventures, and entrepreneurs must guess which approach might work best for them. Only Alvarez et al. (2024) take meaningful steps toward reconciliation by suggesting that less prediction-oriented approaches like creation theory and effectuation can be grouped as a "family" of compatible approaches they call Type I Entrepreneurship Theories. These theories assume (or embrace) Knightian uncertainty and suggest that opportunities are endogenously created through entrepreneurial actions. These are contrasted with Type II Entrepreneurial Theories, such as Lean Startup and the ION, wherein opportunities are assumed to exist and entrepreneurs take actions to find and exploit them. They suggest that one way to reconcile the different theoretical families is based on the level of Knightian uncertainty versus risk. When Knightian uncertainty is so high that no one has trustworthy information about what approach might work, engaging in low-cost conversational experiments or creating acceptable loss products/services based on bird-in-hand resources are the only logical ways to proceed. When one of these experiments begins to gain traction and uncertainty recedes, refining the ideas through stakeholder feedback, as in Lean Startup, makes more sense. Stated differently, Type I Entrepreneurship theories explain the earliest stages of new venture creation and the formation of high-risk ventures that were difficult-to-imagine prior to their coming into existence. Type II Entrepreneurship Theories explain later stages of the venture creation process and the establishment of ventures that involve extensions of existing markets, products, and technologies (Alvarez et al., 2024).

We note that while Alvarez et al. (2024) describe the theory-based view as a Type II Entrepreneurship Theory because it assumes the exogeneous existence of the opportunity within the entrepreneur's theory of the business, it also assumes Knightian uncertainty like Type I Entrepreneurship Theories. However, unlike creation and effectuation, where the response to uncertainty is to make small bets to see what emerges, the entrepreneur assumes their internally consistent theory is as good as anybody else's (because nobody really knows under Knightian uncertainty), and thus works to prove their theory correct. In some ways, the theory-based view is like the old business plan approach except that rather than flushing out an entire business plan as if it is correct, the entrepreneur identifies only the most critical and contrarian elements and works to prove these first, which suggests that it too can be used sequentially with other approaches. Once solutions to contrarian aspects of the theory are established, for example, entrepreneurs might turn toward Lean Startup or effectuation to make sure customers will actually pay for the entrepreneur's new solution and to flesh out other aspects of the business model that will be needed to bring the solution to market.

While we agree with Alvarez et al. (2024) and believe that their reconciliation based on uncertainty versus risk both makes sense and is worthy of empirical scrutiny, we think there might be other complementarities among the four approaches. In particular, it seems worth

investigating the extent to which the four approaches are using different language to talk about the same fundamental processes. For example, Southwest Airlines famously got its start as a 1966 back-of-a-cocktail-napkin drawing by Herb Kelleher at the St. Anthony's Club in San Antonio, Texas (Southwest Airlines, 2024). Is a sketch on the back of a cocktail napkin a conversational experiment (creation theory), a theory of the business (theory-based view), or a first-draft BMC (Lean Startup)? Since the BMC is simply a piece of paper, one could suggest that it is not a large intellectual or resource step-up from a conversation, and it can be viewed as an affordable-to-lose bird-in-hand paper to start crazy quilt conversations with stakeholders (i.e., effectuation). Also, the MVP described in Lean Startup seems akin to an affordable loss product/service created with bird-in-hand resources. The key difference appears to be that the business model/conversation starter is more methodically thought through and data gathered more systematically in Lean Startup. This difference, however, should not matter under Knightian uncertainty where knowing who the right person to talk to is impossible. Under such uncertainty, either approach has an equally random chance of finding the "right" stakeholder, assuming that such a stakeholder exists (which is also unknown).

It appears to us that even those aspects of the different approaches that seem most in conflict might be reconcilable. One such difference under Knightian uncertainty is what the entrepreneur should do when talking to potential stakeholders (whether systematically or in random conversations) yields insights that point the entrepreneur away from their initial idea, whether fully described on a BMC, a product or service created from bird-in-hand availability, or simply articulated through conversation. Creation theory suggests starting a new conversation and repeatedly doing so until something resonates; effectuation suggests asking what the stakeholder wants and will commit to and doing that; the theory-based view suggests finding another solution to proving the theory correct; and Lean Startup suggests "pivoting" those aspects of the proposed model that do not resonate well with the stakeholders in question.

These seemingly large differences regarding how to respond to information that contradicts a proposed business idea might shrink when the nature and source of uncertainty is taken into consideration. As Alvarez et al. (2024) correctly point out, different parts of the business model might confront different levels of uncertainty as the business develops. We agree but point out that full Knightian uncertainty is rare, even in the earliest stages of what eventually emerge as highly innovative business models. Southwest Airlines, for example, looks retrospectively like it introduced a revolutionary new business model, but it was initially modeled on existing intrastate carriers in California. AirBNB's founders are often credited with revolutionizing short-term rentals, but the idea of short-term rentals from private owners was not new; VRBO (vacation rental by owner) was founded 12 years earlier. Tesla is credited for introducing and popularizing electric vehicles, but electric vehicles have been around since the 1830s and General Motors and Toyota had previously mass-produced commercial models. Thus, even businesses that scholars often point to as having emerged from Knightian uncertainty were based on existing ideas and available technology. Further reducing uncertainty, entrepreneurs often start with unique path dependent experiences and knowledge that provide a foundation for identifying and acquiring the missing element(s) needed to successfully commercialize what, in retrospect, look like impossible-to-anticipate business models (e.g., Shane, 2000).

Once the source and nature of uncertainty is defined, complementarities among the four approaches become apparent. For example, abandoning a conversational experiment makes

sense when there is uncertainty about what products and services can be created and who might buy them. However, it might not be the best approach when the entrepreneur has little uncertainty that a new technology works but is uncertain only about how to commercialize it. In such a mixed uncertainty situation, Lean Startup and effectuation's emphasis on taking what you have (MVP in Lean Startup and bird-in-hand in effectuation) and listening to and responding to stakeholders (pivoting in Lean Startup and co-creating in effectuation) seems reasonable. When an entrepreneur has a clear theory about what customers want (even if customers do not know it) but is unsure how to deliver a solution that meets theorized customer needs, experimenting with different solutions as described by the theory-based view makes sense. In sum, while Alvarez et al. (2024) suggest broad categories of uncertainty and risk that might determine broadly when Type I or Type II Entrepreneurship Theories work best, we think uncertainty is a bit more nuanced. Such a possibility suggests future work that describes which tools entrepreneurs use to respond to different sources (and kinds?) of uncertainty and to investigate which responses work best and under what conditions.

Toward a Best-Practice Research Agenda

We believe that the four papers describing four unique approaches to starting a new venture, along with our efforts to clarify their distinctions and commonalities, offer a starting point for future researchers interested in testing the comparative efficacy of these approaches. For such efforts to be successful, however, it will be critical to further theoretically define and then empirically isolate where the approaches are different. For example, the treatment groups in Camuffo, Cordova, Gambardella, and Spina (2020) and Camuffo, Gambardella, Messinese, Novelli, Paolucci, and Spina (2021), cited by Felin et al. (2024) as support for the theory-based view over Lean Startup, were given additional training in how to develop and test hypotheses more rigorously and scientifically. Not surprisingly, the treatment groups using a more rigorous application of Lean Startup as described in papers urging entrepreneurs to act more like scientists (e.g., Zellweger & Zenger, 2023) performed better. However, because both the control and treatment groups developed theory using the BMC and collected data from potential customers as described by Lean Startup, there was no way to isolate unique effects from using the theory-based view. Such a test would require more subtle distinctions between the nature of the theory, whether it is complete as in Lean Startup or narrowly focused on contrarian beliefs as in the theory-based view, whether hypotheses center on customer/stakeholder feedback (Lean Startup) or testing proposed solutions to core problems/subproblems (theory-based view), and whether pivoting occurs when key elements of the business model are not supported (Lean Startup) or when all possible avenues for solving key problems/subproblems are exhausted (theory-based view). These are subtle but important distinctions that will require additional efforts to articulate clear differences that allow more refined tests. As we have suggested, we believe Sarasvathy's 2×2 matrix might be one tool for defining such subtle distinctions.

We also agree with both Alvarez et al. (2024) and Felin et al. (2024) that steps towards a contingency approach have merit. What the entrepreneurs starts with might be one example. With its focus on finding solutions to problems/challenges that stand in the way of delivering a theorized product/service, the theory-based view implies starting with the entrepreneur's contrarian theory about what customers want and will pay for. Like effectuation, Lean Startup

often starts with a (bird-in-hand) solution or set of resources (e.g., new technology, the founder's skills) and looks for a set of customers (using the Market Navigator to prioritize possibilities) who will pay for a product/service configured from those solutions/resources (hence, the focus on "product-market fit"). Although the entrepreneur would still need to make sure customers will pay for any solution they develop, this observation suggests there might be advantages to adopting the theory-based view when entrepreneurs see a customer need but have no idea how to address it and Lean Startup when they have potentially valuable solutions/resources that can be configured in multiple ways and the goal is to find the right product-market fit. Whether our speculation is correct is a question for future research.

Consistent with efforts to learn what works best under different conditions, we also see value in describing what entrepreneurs actually do and explaining why. Among all new ventures created each year, what percent adopt one or more of these approaches? Are there contingencies that drive entrepreneurs toward one approach over another? Sarasvathy (2024) suggests effectuation is descriptive of what experienced entrepreneurs do because they have learned the approach through trial and error. It seems likely that there are other contingencies besides experience. We previously used the example of Southwest Airline's start on a cocktail napkin as evidence of a minimalistic bird-in-hand BMC/business theory, but that was not the first conversation Herb Kelleher and Rollin King had about starting an airline. Consistent with Alvarez et al.'s (2024) hypotheses that Type I entrepreneurial processes take place earlier and in more uncertain stages of new venture creation, perhaps their previous conversational experiments did not resonate, and the napkin marked a transition from a creation theory conversational experiment to another startup processes. The nature and context of the entrepreneur or entrepreneurial team might furnish another important contingency. Teams might, for example, be more likely to adopt a confluence of approaches, and entrepreneurs/teams based in certain locales (e.g., Silicon Valley) or with certain kinds of stakeholders (e.g., venture capital) might be more likely to adopt certain approaches under normative institutional pressures.

Given the importance of uncertainty as a defining characteristic of entrepreneurial action, it is important for scholars to define it more precisely, and perhaps describe gradations of uncertainty, not unlike Milliken (1987), but in ways that are better suited for entrepreneurship. Doing so seems important given the degree to which different theories of new venture creation rely on Knightian uncertainty as an assumption. It seems likely there might be variations of uncertainty between absolute uncertainty, where no one knows anything, and risk, where probabilities can reasonably be assigned. Creation theory, in particular, seems most appropriate for "no one knows anything" uncertainty where conversations are logically the only avenue toward creating some sort of collective reality. The theory-based view similarly requires a high level of uncertainty wherein only the entrepreneur and their team have any confidence in what they theorize (Felin & Zenger, 2017). Effectuation and Lean Startup, in contrast, require some knowledge about what the entrepreneur has available to them and, in the case of effectuation, what they are willing to lose. These approaches also suggest that some stakeholders have preexisting knowledge regarding what they would like and are willing to support. Overall, while we believe that all four approaches have value under conditions where probabilistic outcomes (i.e., risk) are impossible to assign, the level and breath of reliable knowledge, and thus uncertainty, varies across people and situations, and such variation might affect which approach to new venture creation entrepreneurs gravitate toward in different situations and which approach is normatively optimal.

More research is needed to empirically connect (or differentiate) the four approaches. To be impactful, this research should articulate the assumptions made about entrepreneurs, the processes they undertake, expected outcomes, and relevant contingencies. Such research would offer a more descriptive (and realistic) view of the entrepreneurial act and address at least four areas of concern. First, this research would be helpful in delineating how the entrepreneurial act unfolds under each approach and how (when) it is triggered. Unlike in prior ION research where would-be entrepreneurs are immersed in the market and presumed to be knowledgeable and motivated by a desire to make a profit, the four approaches appear silent about entrepreneurial motives and how they shape the actions entrepreneurs undertake.

Second, all four approaches assume relatively rational behavior regarding how entrepreneurs respond to feedback, which contradicts research showing that entrepreneurs often erect emotional, cognitive, and behavioral barriers that slow their learning and adaptation (e.g., Argote 2012; Huber 1991). How do such barriers affect their chosen path to new venture creation? Do they "stick" to one approach throughout the process, or do they switch among the four approaches, and if so when, how, and to what effect? For example, Lean Startup and the theory-based view adopt a mechanistic view: If you fail, then you pivot! However, failure might have paralyzing emotional and behavioral consequences; it might also lead to stubbornness and persistence along the same path (Grimes, 2018). Alternatively, as Sarasvathy (2024) suggests is the case with effectuation, prior successes versus failures might shape which approach entrepreneurs adopt in subsequent efforts. Potential differences in predictions regarding the effects of feedback or failure across the four approaches therefore seem worthy of study.

A third area of concern comparative research might address pertains to the role of the entrepreneur. Research shows that many ventures (especially in high-tech) are created by two or more individuals (Nikiforou, Zabara, Clarysse, & Gruber, 2018), which raises the question: When entrepreneurs work in teams, does a collective approach develop? If so, when and how? The four approaches seem to overlook team dynamics and how they might influence decisions. For example, conflicts and power differentials within entrepreneurial teams could shape individual and collective learning, reaching agreement, and pivoting. In fact, some of the entrepreneurial activities (e.g., pivoting and scaling up) may induce conflicts and fragment the team's vision for the venture.

A final area of concern that might be addressed pertains to generalizability across time and location. Longitudinal studies, especially in different international and thus institutional settings are needed to establish the usefulness of the four approaches across contexts. With globalization and the proliferation of born global and born digital new ventures, we need cross-national field and archival studies. Rigorous empirical examinations are needed, for instance, via randomized control trials, that take into consideration the full scope of the Lean Startup toolset and offer an unbiased comparison between approaches.

Conclusion

The first four papers of the special issue present different and, at times, seemingly conflicting descriptions of new venture processes, descriptions that conjure the proverbial parable of blind men and the elephant. We juxtaposed several assumptions, predictions, and normative claims among these competing approaches to help clarify their differences. We also highlighted ways these competing approaches might describe the same phenomenon—the same

proverbial elephant—using different language. Our discussion illustrates the growing richness of theoretical views but also shows the need for continued dialogue among scholars. Finally, we presented some ideas for moving forward toward further reconciliation and toward empirical research that might help researchers better understand the efficacy of competing approaches under different conditions. Our hope is that by juxtaposing competing approaches described thus far in the special issue, we further the conversation describing what entrepreneurs do under different circumstances and normatively should do to maximize their chances of success.

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A Scientific Method for Startups

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Recent scholarship has sought to develop a "scientific method" for startups. In this paper we contrast two approaches: lean startup and the theory-based view of startups. The lean startup movement has served an important function in calling for a normative and scientific approach to startups and venture creation. The theory-based view shares this agenda. But there are differences in the underlying theoretical mechanisms and practical prescriptions suggested by each approach. We highlight these differences and their implications for both research and practice. For example, we contrast lean startup's emphasis on bounded rationality and entrepreneur–customer information asymmetry with the theory-based view's emphasis on generative rationality and belief asymmetry. The theory-based view focuses on contrarian beliefs, associated problem formulation, and the development of a startup-specific causal logic for experimentation, resource acquisition, and problem solving. The right mix of entrepreneurial actions is contingent and startup-specific—guided by a startup's unique theory. After pointing out differences between the lean and theory-based view of startups, we discuss opportunities for partial reconciliation, as well as opportunities for empirically comparing perspectives. Overall, we emphasize that a scientific method for startups needs to recognize the importance of contingent,

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discriminating alignment between entrepreneurial theories and the actions they prescribe (including different types of experimentation and validation, search, and forms of organization).

Keywords: *entrepreneurship theory; macro topics, knowledge management; entrepreneurial/ new venture strategy*

Introduction: Entrepreneurs as Scientists

Lean startup—as developed by Blank (2013), Blank and Dorf (2012), Ries (2011), and Osterwalder and Pigneur (2010)—has had a significant influence on how entrepreneurs approach startups and new ventures. Lean startup has also begun to shape how academics study and teach entrepreneurship (e.g., Leatherbee & Katila, 2020; Shepherd & Gruber, 2021), offering a framework and practical tool that also captures some of the insights of longer-standing academic literatures—including the literatures on technology evolution, organizational learning, product development, and strategic management (Contigiani & Levinthal, 2019).

We strongly endorse the normative message of lean startup, namely, that entrepreneurs can optimize their odds of success when they adopt a "scientific approach to the creation of startups" (Ries, 2011). The idea that entrepreneurs should act like scientists—and utilize the scientific method—is the central premise of the theory-based view (Felin & Zenger, 2009, 2016, 2017; Felin, Gambardella, & Zenger, 2021; Zellweger & Zenger, 2023). This approach has been formally modeled (Ehrig & Schmidt, 2022; Camuffo, Gambardella, & Pignataro, 2023a) and empirically tested through randomized control trials (e.g., Agarwal et al., 2023; Camuffo, Cordova, Gambardella, & Spina, 2020; Novelli & Spina, 2024). The theory-based view of startups concurs with lean startup's emphasis on the scientific method and its focus on practical action and hypothesis-driven experimentation. Both lean startup and the theory-based view can be seen as part of an important normative movement within strategy and entrepreneurship that seeks to identify practical "interventions," treatments and forms of training that might enable startups and companies to be more scientific and evidence-based about their decision making (e.g., Chatterji, Delecourt, Hasan, & Koning, 2019; Heshmati & Csaszar, 2023; Kotha, Vissa, Lin, & Corboz, 2023). But we argue that these interventions need to be theory-guided, both at the level of their scientific investigation and at the level of startups and firms themselves.

In this article, we take Blank and Eckhardt's (2023) recent contribution as a reference point and offer contrasts between the theory-based view of startups and lean startup. We do so particularly in terms of the central mechanisms and the prescriptive "method" suggested by each approach. While some of these differences have briefly been discussed before (Felin, Gambardella, Stern, & Zenger, 2020), we go well beyond this work by addressing the central and novel points raised by Blank and Eckhardt (2023) in their target article. We recognize that lean startup has been further developed since its original conception—adding new frameworks and tools (e.g., Shepherd & Gruber, 2021), empirical tests (e.g., Burnell, Stevenson, & Fisher, 2023; Leatherbee & Katila, 2020), and links to adjacent disciplines (e.g., Ramoglou, Zyglidopoulos, & Papadopoulou, 2023). Some of these extensions suggest

that the gap between the lean and theory-based approach to startups might be narrowing. However, the need to point to differences is made evident by Blank and Eckhardt's (2023: 4) suggestion that the theory-based view is "consistent" with lean startup—a conclusion we do not fully endorse. While both approaches can broadly be "viewed as an application of the scientific method to entrepreneurship" (Blank & Eckhardt, 2023: 2), the specific mechanisms, assumptions, interventions, and practical prescriptions for startups and entrepreneurs are substantially different. We carefully point out these differences and offer possible complementary future directions that could further the development of a "scientific method" for startups. Some of the differences between the theory-based and lean view of startups can be reconciled by a "contingent" approach to entrepreneurship—an approach that recognizes the contextual and situational factors that shape which method or practice should be utilized (when and why), depending on the startup-specific theories held by an entrepreneur. We conclude by pointing out the need for those architecting startups to pursue a discriminating alignment between the type of theory entrepreneurs seek to explore and the downstream actions or choices related to different forms of experimentation and organization.

Lean Versus Theory-Based Startup

Blank and Eckhardt (2023) offer an extensive summary of lean startup, including a discussion of key concepts and tools such as Business Model Canvas and Market Opportunity Navigator (cf. Gruber & Tal, 2017, 2024; Osterwalder & Pigneur, 2010). Their paper provides a highly useful articulation of the current state of the lean startup approach, including links to recent developments (building on Shepherd & Gruber, 2021; cf. McGrath & Macmillan, 2000). Blank and Eckhardt's paper also points to links between lean startup and adjacent theories and approaches, such as effectuation, bricolage, and discovery-creation. To their credit, their paper is inclusive and far-ranging. However, given space considerations, in this paper we focus largely on contrasting lean startup's core assumptions and arguments with those of the theory-based view of startups.

Lean Startup: Foundations and Model Assumptions

As argued by Blank and Eckhardt (2023), the "core" premise of lean startup is that entrepreneurs and startups need to forego excessive planning and quickly engage with customers, for example by developing a minimum viable product. While attention is given to other stakeholders through tools like Business Model Canvas, Blank and Eckhardt specifically emphasize the need to "[reduce] *information asymmetries* between entrepreneurs and customers" (2023: 5, italics added). The assumption behind this information asymmetry is that customers have vital information or knowledge that a startup needs to somehow elicit, access, or incorporate into their nascent product, service, or value offering. The sooner the entrepreneur engages with the customer, the quicker this information asymmetry can be reduced. In short, lean startup's primary emphasis is on "early and frequent customer feedback"—"quick rounds of experimentation and feedback"—to enable startups to "continually learn from customers" (Blank, 2013: 5-7). Notice that, according to lean startup, this asymmetry of information is *one-sided*, where the key information and knowledge is held by the customer and needs to be accessed by the startup.

Consistent with the concept of information asymmetry, lean startup builds on the idea of bounded rationality. As discussed by Blank and Eckhardt, entrepreneurs "are imperfect decision makers who suffer from biases in decision-making" (2023: 6). The argument is that bounded rationality is reduced or lessened if startups use the lean method—again, by garnering information and knowledge through various forms of customer interaction and validation. Lean startup recognizes that entrepreneurs cannot somehow access "all" customers, but they need to satisfice by securing frequent, "good enough data" from them (Blank, 2013). Customer interaction and feedback is meant to offer much-needed, ongoing scientific validation and evidence to ensure the venture is moving in the right direction—rather than wasting resources.

Several questions emerge from the emphasis that lean startup puts on information asymmetry between customers (or even other stakeholders) and the startup, as well as the strong emphasis placed on bounded rationality as an underlying assumption. For example, is customer interaction indeed the best way to validate a startup's product idea, value offering, or strategy, relative to many other alternatives? Can customer interaction reliably offer a signal about what a startup should do? Is the emphasis on bounded rationality the right way to think about entrepreneurial cognition and startup learning? We discuss these questions in turn.

While customer feedback undoubtedly can be useful in some situations, there are several problems with focusing on customer feedback as the central mechanism for learning and validation. The immediate, practical problem with customer feedback is that it is likely to be extremely heterogeneous. One customer might like a particular product feature while another might not. Feedback might be highly idiosyncratic depending on the customers the startup happens to sample and interact with, and efforts to avoid the problem of idiosyncratic feedback—for example by sampling an even larger set of customers—only compound the problem. Customers might offer indefinite thoughts on how a particular product should evolve and what features ought to be added, improved, or completely removed. Lean startup offers no coherent mechanism for arbitrating between all this information, to recognize which bits of information might actually validate an idea or product and which might lead a startup astray. Interestingly, this problem was recognized in early work related to business models. As noted by Osterwalder and Pigneur, "another challenge lies in knowing which customers to heed and which customers to ignore" (2010: 129). To foreshadow our argument, we think theories are fundamental to the process of knowing who to listen to (or which customers or stakeholders to even solicit feedback from). In short, with heterogeneous customer feedback, it is hard to separate the signal from the noise.[1]

Of course, in principle, there is nothing wrong with sampling and interacting with customers. As we discuss below, in some situations, the right form of customer interaction and experimentation can be useful; however, our central point here is that customer interaction is not a panacea for validation, and there is no clear reason to make information asymmetry between customers and startups—and the bounded rationality of the latter—the central problem that needs to be solved.

Customer feedback is but one of many tools and forms of experimentation and intermediate validation that a startup can use to guide its actions. When it comes to startup activity, there are no one-size-fits-all tools. Of course, whether customers buy a product is the ultimate market test and (eventual) source of validation. But it is not clear why customers might have better information than startup founders themselves when *developing* the startup's

product or value offering that is offered to customers. Customers might not even have a proper awareness of their own needs. Thus, much-needed validation might come from problem solving, experimentation, and exploration that do not initially involve customers at all. This could involve searching for a critical technology, exploring key assumptions, or conversing with potential resource providers. Validation might also come through efforts to elicit the engagement and buy-in of co-founders, early employees, and investors—actors who have far more riding on the possible success of the startup than customers. In fact, in some cases, founders and early employees are essentially customers themselves. They can be seen as lead users whose opinions and tastes shape how a product offering or technology evolves (as historically has been the case with Apple). These employees create the products they would like to see exist, rather than asking customers what they think is needed.

Importantly, customer feedback is of less value in situations where startups seek to develop radically discontinuous, novel product offerings and new sources of value. Customers might offer useful, incremental improvements on products that they are already habitually aware of and familiar with, but novel product offerings often demand more than casual responses to a mocked-up product. As we will discuss, the most valuable product and business ideas emanate from theories involving "what-if" forms of causal logic, that is, what if the following assumptions are true or the following problems can be solved? Obtaining quick customer feedback on such forms of novelty requires customers to imagine and embrace the underlying causal logic, which may be extraordinarily difficult to achieve without first demonstrating the accuracy of assumptions or the solvability of subproblems. This is aptly captured by Henry Ford's famous quip: "If I had asked customers what they wanted, they would have said a faster horse." It is also not clear that Henry Ford would have generated highly useful feedback from a rapidly developed crude prototype of the Model T.

Bounded rationality—an idea closely linked to information asymmetry—forms a second central assumption of lean startup, as discussed by Blank and Eckhardt (2023: 6). Boundedly rational models of search and decision-making essentially build on the idea of an information asymmetry between the searching actor and the environment (Simon, 1956). Searching actors cannot process or compute information omnisciently, and they therefore need to selectively sample and satisfice. In the context of lean startup, this sampling and information gathering is done by interacting with customers and by soliciting feedback on minimum viable products.

Lean startup's focus on bounded rationality is aptly captured by Leatherbee and Katila in their work. They emphasize how "bounded rationality—finite information, finite minds, and finite time—makes young firms imperfect decision-makers" (2020: 571). Essentially, startups need to access information, advice, and feedback from customers to "mitigate" against bounded rationality. The logic of mitigating against bounded rationality—by seeking external advice and feedback (or "opening the aperture")—has been discussed more broadly in entrepreneurship, in contexts such as incubators and entrepreneurial strategy (e.g., Cohen, Bingham, & Hallen, 2019; Miller, O'Mahony, & Cohen, 2024). Bounded rationality is also the underlying assumption of the literature in entrepreneurship that highlights the role of heuristics and information processing in uncertain environments (e.g., Artinger, Petersen, Gigerenzer, & Weibler, 2015). Bounded rationality of course is a central concept not just in entrepreneurship but also in organization economics, management, and strategy more broadly (e.g., Puranam, Stieglitz, Osman, & Pillutla, 2015).

When applied to startups and entrepreneurs, however, the concept of bounded rationality—particularly when operationalized as the one-sided information asymmetry between startups and customers—comes with some unhelpful baggage, in terms of what is assumed about human cognitive capacities and the organism-environment relationship. The focus on information processing—and associated bounded rationality—places emphasis on the cognitive task of seeing or "reading" the environment correctly (Chater et al., 2018). This makes entrepreneurial judgment and decision-making into a computational or representational task where the relevant data is "out there"—in the environment (for example, information held by customers)—and needs to somehow be appropriately mirrored, sampled, or processed. Applied to lean startup, the idea here is that entrepreneurs should focus on quickly learning from their environments—customers and other stakeholders—and apply these lessons to their products and strategy.

However, from a theory-based perspective, entrepreneurs do not want to accurately mirror their environments in the sense suggested by the idea of information processing. Entrepreneurial decision-making necessarily aspires to be *generative*. Startups are essentially trying to render something true that currently is untrue. Startups are seeking to create and essentially *present* sources of value rather than represent their environments. This creates a mismatch with the focus on bounded rationality and information processing. The idea of bounded rationality is focused on a representation of environments (in whole or in part; Chater et al., 2018), and it is usually applied to tasks with an objective answer, as is illustrated by popular experiments where subjects are asked to identify which of two cities has a larger population (Gigerenzer & Goldstein, 1996; for a review, see Felin & Koenderink, 2022). Search tasks like this, however, hardly capture the essence of entrepreneurial decision-making, which is focused on forward-looking beliefs and novelty. In entrepreneurial decision-making—unlike situations where bounded rationality is the relevant constraint—there is no "lookup table" for the right answer. Yet, lean startup essentially treats customer feedback as a form of lookup table for validated truth. In the uncertain environments which characterize most startup activity, however, there is no such table—and even if there were, the lookup table would only match current realities rather than the future ones that entrepreneurs are attempting to create.

Another problem with anchoring on bounded rationality in entrepreneurial decision-making—specifically in terms of the focus on human bias and error—is readily evident in a particular comment made by Blank and Eckhardt. They argue that "with appropriate training and discipline, agents can *at best* become boundedly rational decision agents" (Blank & Eckhardt, 2023, emphasis added). Lean startup essentially positions itself as a method for mitigating against human mistakes and errors by the entrepreneur (cf. Kahneman, 2011). Error-avoidance in decision-making is, of course, important, but by focusing on error-avoidance and bounded rationality—which provides the central logic for why lean startups should quickly validate ideas, products, and value offerings with customers—one is likely to only consider conservative options (including ones that can be more immediately validated), rather than options that go beyond the incremental. The very mechanism of pushing for early interaction with customers reinforces this conservatism. As a new lean startup tool to combat this tendency, the Market Opportunity Navigator invites a "more distant or global search for where to play" (Shepherd & Gruber, 2021: 971).

The emphasis of the theory-based view of startups is different from lean startup. This is not to say that lean startup is completely wrong, but simply to point out that there are substantive differences in what is prescribed to entrepreneurs. As we discuss below, the theory-based

view argues that the most valuable forms of entrepreneurship emerge from contrarian beliefs and theories involving what-if forms of causal logic—logic that requires entrepreneurs and those evaluating what they propose, to essentially imagine an unseen state of the world, one in which a currently unsolved problem is solved. In many cases, rapid customer feedback is not the optimal place to start developing or testing such a theory. With such novel forms of entrepreneurship, the adage that "you cannot observe the counterfactual" has particular meaning. With these most valuable forms of entrepreneurship, you simply cannot observe the relevant facts or evidence, or even elicit them from customers or other stakeholders.

Theory-Based Startup: Different Foundations and Model Assumptions

The theory-based view of startups begins with different foundations and underlying assumptions from those of lean startup. The theory-based view of startups sees information, knowledge, and rationality through a very different lens. It sees humans—including economic actors like entrepreneurs—as *generative* agents rather than boundedly rational information processors, a critical distinction (Felin, Koenderink, & Krueger, 2017; also see Chater et al., 2018). Generative rationality means that rationality is not about asymmetric information processing—that is, the processing of data from customers, other stakeholders, or the environment—rather, rationality is highly proactive, shaped, and directed by the economic actor itself. The overly abstract notion of an environment, as traditionally understood in management, is not a meaningful construct within the theory-based view, nor is the idea of information asymmetry, as traditionally understood. Rather, the theory-based view emphasizes the role that beliefs, hypotheses, and theories play in directing awareness and attention toward highly specific, possible things in one's surroundings (again, rather than the computation of information somehow received from the outside).

The central premise of the theory-based view is that humans do not strictly (or directly) learn from the environment. Rather, observation and learning are necessarily theory-laden. It is only when armed with a theory that something in the environment becomes salient and meaningful. Humans learn as their theories and hypotheses direct their perception, attention, and awareness toward specific things. Humans are endowed with a natural capacity for theorizing and hypothesizing about their surroundings, and it is this activity that is behind the emergence of novelty. Thus, entrepreneurs with different theories learn different things from the same environment (or customers, for that matter). Environments and environmental learning are therefore theory-specific. This mirrors the process of learning and knowledge acquisition in human development (Gopnik, Meltzoff, & Kuhl, 1999; Spelke, Breinlinger, Macomber, & Jacobson, 1992), evolutionary biology (Felin & Kauffman, 2023), as well as science (Popper, 1969). Environments "teem" with possible things that an agent might focus on and become aware of. But much of this remains latent, outside awareness (Felin & Koenderink, 2022). Things—any type of data or information—only become salient or visible in light of the hypotheses and theories that agents possess. This logic is aptly captured by Einstein who argued that "whether you can observe a thing or not depends on the theory which you use. It is the theory which decides what can be observed" (Polanyi, 1974: 64). This is the central starting point of the theory-based view.

This emphasis on theory might at first glance be seen as broadly consistent with lean startup. In fact, in the target article Blank and Eckhardt (2023) emphasize the importance of theory. Citing some of our recent work (specifically Felin, Gambardella, Stern, & Zenger,

2020), Blank and Eckhardt argue that "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" (2023: 7).

The emphasis on first developing a theory is welcomed by us.[2] However, while the emphasis on theory is welcome, we suggest there is work that remains in composing this integration. While perhaps an accidental oversight, the word "theory" or "hypothesis"—or any derivation of either word—is not even mentioned by Blank and Eckhardt in their table, which lists 24 different "key concepts and constructs" for lean startup (2023: 9-10). The authors certainly do discuss theories and theorizing in other parts of their article, but we think this omission from the summary of lean startup may simply highlight how hard it is to reconcile the idea of proactive theorizing with Blank and Eckhardt's heavy emphasis on bounded rationality and a one-way information asymmetry between entrepreneurs and customers (and the need for the former to learn from the latter). If information asymmetry between entrepreneurs and customers is indeed the central problem—as they argue—then lean startup is logically consistent in placing its primary emphasis on reducing that asymmetry by "[favoring] rapid information gathering" (Blank & Eckhardt, 2023: 2).

The theory-based view does not make information asymmetry between entrepreneurs and customers (or other stakeholders)—or even the cognitive boundedness of entrepreneurs—its centerpiece. This is because relevant information is not necessarily held by customers (although it can be). Rather, the theories that entrepreneurs develop can be seen as having informational content themselves—thus, if anything, the asymmetry might in fact run in the other direction where startups need to educate customers rather than the other way around. Importantly, however, information and associated insights are theory-dependent. Put differently, theories encapsulate knowledge. Theories guide entrepreneurs to look for and observe specific things. The central assumption behind this approach is that all humans—including scientists and economic actors like entrepreneurs—engage in a quasi- or proto-scientific activity of hypothesizing and theorizing when engaging with their surroundings. Granted, just like in science, this process is not without its errors (Zellweger & Zenger, 2023). Critically, however, entrepreneurial theories might in fact go against existing data, information and even scientific (or customer) opinion and lead to—as pointed out by the Einstein quote above—the identification of novel data and information. Lean startup's emphasis on "rapid information gathering" from customers (Blank & Eckhardt, 2023: 2) might lead to the premature invalidation of the most valuable theories.

To further contrast lean and the theory-based view of startups, while lean startup focuses on the asymmetry between entrepreneurs and customers in terms of *information*, the theory-based view focuses instead on heterogeneity and asymmetry in *beliefs*. Contrarian, discrepant or unique beliefs are the raw material of hypotheses and theories (Felin et al., 2021). Startups can be seen as a unique point of view, conjecture, or hypothesis about the future. Contrarian beliefs enable startups to see the world differently and to "hack" seemingly efficient, strategic factor markets (cf. Barney, 1986; Felin, Kauffman, & Zenger, 2023). Contrarian or divergent beliefs represent a point of view that by definition is not widely shared—which is the source of their value—and precisely because of their uniqueness, those holding such beliefs may find it hard to secure funding or other forms of intermediate validation (from customers or other stakeholders; Benner & Zenger, 2016).

One way that this idea of a startup-specific "point of view" manifests itself specifically is in how it sees the process of search. To offer a contrast, the aforementioned Market Opportunity Navigator—a tool that is part of lean startup—is a framework that enables

startups to engage in "distant or global search." The goal of distant or global search is to find and "identify a portfolio of market opportunities," assess their "relative attractiveness" and to "choose the most promising option" (Shepherd & Gruber, 2021: 971-973; building on the work of McGrath & Macmillan, 2000). This form of general or global search—delineating options, comparing them, and choosing the best one—is certainly valuable and offers a plausible tool for startups to identify valuable opportunities. However, the theory-based approach to search is quite different. Search within the theory-based view is seen as a highly targeted process, where contrarian beliefs and theories provide startups with a "search image" that enables the recognition of value that is not evident to others (Felin et al., 2023). This might sound like a mere semantic distinction, but the distinction is in fact quite fundamental. Namely, with distant or global search there is a focus on information processing, that is, a focus on listing and amassing promising options or opportunities, comparing them, and choosing the best one (Shepherd & Gruber, 2021). The theory-based view, on the other hand, emphasizes that the salience or recognition of a valuable option is theory-dependent in the first place. Thus, the theory-based view does not focus on traditional forms of search (for example, on landscapes or other types of environments) but sees the process as a far more targeted one—a process of searching-*for* rather than searching-*through*. The distinction between global (or local-distant) versus theory-specific search has not only been discussed in the context of value creation (Felin et al., 2023), but it also has foundations in the cognitive sciences and research in the field of perception (see Chater et al., 2018).

Another reason that asymmetric, heterogeneous beliefs are emphasized by the theory-based view—over one-sided information asymmetry and bounded rationality—is because valuable beliefs may initially appear delusional to others—not just to customers, but also to other market actors or potential stakeholders, like investors. Beliefs that may turn out to be true (eventually), may go against existing data, evidence, and understandings, as is readily evident in the history of science. In fact, the more breakthrough or revolutionary the theory, the more likely it is to go against existing data and therefore lack access to immediate validation. To illustrate, Galileo had a contrarian and (at the time) unorthodox belief that the Earth orbited around the sun. The data, observations, and scientific consensus at the time were all against Galileo's theory (Wootton, 2010). Existing scientific observations, data, and facts *in*validated him. Therefore, he resorted to alternative sources of validation and evidence for his contrarian belief—new sources of data and experimentation illuminated by the theory. Eventually Galileo was proven correct. Startups similarly may possess contrarian beliefs and be in pursuit of realities that presently lack validation, data, and evidence. Startups of course are not providing validation or evidence for the laws of nature, but, rather, for the possible value of future products, strategies, and sources of value. This requires startups and firms to develop their own, underlying causal logic for "intervening" in the world and uniquely creating value (Felin & Zenger, 2017; cf. Heckman & Pinto, 2023; Pearl & Mackenzie, 2018).

If—as we suggest—customers (or even existing data) are not a reliable source of validation for a startup, then what is? The theory-based view recognizes any number of different mechanisms and intermediate sources of experimentation and validation for the realization of value. Notice that the mechanisms of validation advocated by lean startup—various forms of customer interaction and feedback—are but one of many ways for a startup to be more evidence-based and scientific. The choice of mechanism and scientific method depends on what a startup seeks to do and the type of theory the startup hopes to realize (Wuebker, Zenger, & Felin, 2023). The method of validation is theory-dependent. The theory-based

view sees the realization of a contrarian belief about value as a process of problem formulation and problem solving. Intermediate "validation" (of a sort)—and the eventual realization of a value offering—here comes from searching for and finding a solution to a problem (Hsieh, Nickerson, & Zenger, 2007) or solutions to a structured set of subproblems (Felin et al., 2021) that, if collectively solved, solve the larger problem. That is, a startup's contrarian or discrepant belief provides the impetus for carefully thinking about and formulating the set of assumptions that must be true, or the set of subproblems that must be solved in order to make a belief true. Once formulated, startups can then search for feasible solutions to these subproblems, or seek out evidence to validate assumptions. Failure to validate an assumption or solve a subproblem prompt early pivots—pivots that, when possible, preserve the remainder of the theory (Ehrig & Schmidt, 2022). Importantly, these early pivots can occur long before customer feedback on a complete solution is possible.

To offer a practical example of this process, consider Steve Jobs's contrarian belief of the mid to late 1970s that computers would be a mass-market product—a belief that led Steve Jobs and Apple to engage in a process of problem formulation and problem solving. The contrarian belief was central for initiating the process of value creation. At this point in time, it was by no means obvious that personal computers would become a mass-market product, as existing applications of computing were focused on industrial and research settings or large-scale, specialized office applications. Even the first microcomputer, the Altair 8800, sold less than 10,000 units globally, which certainly did not suggest a basis for widespread consumer demand. The data at the time seemed to suggest that Jobs's belief in the possibility of personal computers was wrong, if not delusional. Undeterred, Jobs's contrarian belief led to the formulation of a theory and the articulation of central subproblems that stood in the way of solving the broader problem of rendering personal computers a mass consumer product. These subproblems included that computer use at the time required highly specialized skills, that computers were prohibitively expensive, that computer interfaces were hard if not impossible for lay people to interact with, that computers lacked aesthetic appeal and that the extant applications had no resonance with the average consumer. Once formulated, such problems enabled Jobs and Apple to search in a very direct way, to be guided toward and recognize subproblem solutions that enabled the development of a persuasive final product—the personal computer.[3] We suspect that an early effort to quickly roll out a clunky minimum viable product would merely have frustrated consumers and producers, rather than provide productive feedback.

We recognize that Blank and Eckhardt discuss various opportunities to advance and strengthen the lean startup approach—from its original conceptualizations—and specifically highlight the need to include "improvements to theorizing" (2023: 15-16). They argue that Osterwalder and Pigneur's Business Model Canvas (BMC) "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" (Blank & Eckhardt, 2023: 16). We concur that the BMC indeed features many important issues that a startup should consider: key partners, activities, resources, cost structure, value propositions, customer relationships, channels, revenue streams, and customer segments. As we discuss next, however, we see hypotheses and theories as something that originates from contrarian beliefs about how to solve problems, rather than an exercise in mapping business models across categories like key partners or cost structure. In our minds, the elements featured in BMC represent important downstream questions to consider *once* a contrarian view and theory of value has been articulated. Specifically, a theory enables the formulation of a problem and subproblems and guides the subsequent search for

solutions to these problems. Many of the formulated problems can then in fact be addressed by considering BMC-related elements like key partners or resources—but it is the overall theory that enables the startup to recognize and see any of these possibilities (for example, in terms of how/which key partners might help or what particular resources might be needed).

Beyond theory, Blank and Eckhardt also recognize the importance of the construct of a problem and, particularly, what they call "problem testing." However, problem testing, according to Blank and Eckhardt, "*starts* with ethnographic interviews" of customers and others that might have insights into various aspects of the BMC (2023: 7, emphasis added). From the perspective of the theory-based view, problems are not "tested" per se (although certainly some aspects might be). Rather, startups should first formulate a problem and relevant subproblems, compose a theory, and then engage in a process of solving subproblems by acquiring relevant resources, finding relevant technologies, or partnering with particular stakeholder or actors. We discuss the logic behind this argument next, and link it to the practical tool—called Value Lab—that originates from the theory-based view.

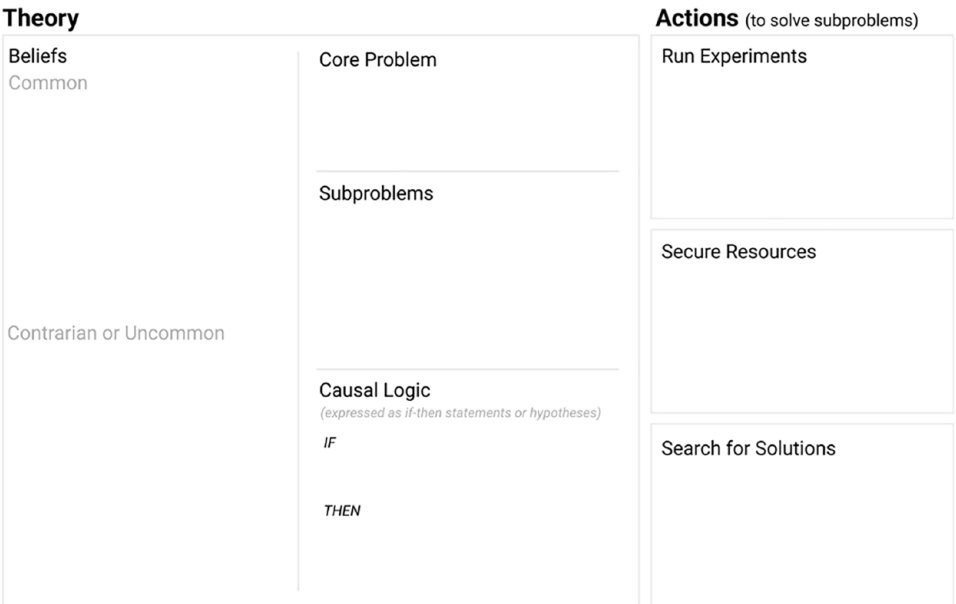
Practical Framework and Examples: Lean Versus Theory-Based Approach

Since both the theory-based view and lean startup are normative, it is important to delineate the "steps" and advice that each approach respectively offers for startups and entrepreneurs. In many ways, lean startup's great virtue is that it has offered a set of practical tools for startups (Shepherd & Gruber, 2021). This research is in line with extant work that has sought to specify different types of "interventions," treatments, and normative prescriptions that might enable startups and companies to be more effective in their decision-making (e.g., Chatterji et al., 2019; Heshmati & Csaszar, 2023; Kotha et al., 2023; Morris, Carlos, Kistruck, Lount, & Thomas, 2023). This work is in stark contrast to much academic research in entrepreneurship, which focuses on empirical description or theoretical abstraction, and therefore tends to be less accessible and useful to practitioners. The theory-based approach shares the desire to offer a normative framework for intervening in the world—even a pragmatic tool to help entrepreneurs be more effective (Felin et al., 2021). The theory-based view asks startups to envision how they might counterfactually "intervene" in the world—emphasizing causal analysis and causal inference (Frisch, 2013; Heckman & Pinto, 2023; Pearl & Mackenzie, 2018)[4]—and further asks startups to develop their own, unique, forward-looking "causal logic" for how to create value. The more general premise of the theory-based view is that theories inherently are (or should be) practical or pragmatic. Any intervention made by startups should be theory-guided. Thus, we strongly concur with Lewin who argued that "there is nothing so practical as a good theory" (1943: 118).

Value Lab as Practical Tool: Causal Logic for Theory Building and Testing

Blank and Eckhardt (2023) discuss and highlight some of the key *practical* frameworks of lean startup in their article, such as the Market Opportunity Navigator and Business Model Canvas. To offer a contrast to these frameworks, we discuss below a practical framework based on the theory-based view, called the Value Lab (see Figure 1, building on Felin et al., 2021). Contrasting the prescriptions of lean startup and the theory-based view is useful as it highlights what is practically emphasized and normatively suggested to entrepreneurs.

Figure 1
Value Lab



Source. Adapted from Felin, Gambardella, and Zenger (2021: 70).

At a high level, Value Lab invites entrepreneurs and their collaborators to engage in three conversations to develop their theories and underlying causal logic for value creation. The first is a conversation about beliefs. Here entrepreneurs are pushed to articulate what they believe—specifically, what they believe that is in some form distinct, different, or contrarian from what others believe in relation to a space they seek to enter or a problem they seek to solve. Beliefs are the essential "raw material" of hypotheses and theories. The reason valuable beliefs need to be distinct, contrarian, or discrepant is because this enables startups to attend to potential sources of value that are not evident to others. Beliefs that are contrarian—somehow unique and different—enable entrepreneurs to "hack" competitive factor markets and create value (Barney, 1986; Felin et al., 2023). After all, value creation happens in a competitive context where obvious sources of value are likely to be competed away, thus placing a premium on unique and different ways of seeing the world.

As highlighted by Value Lab (see the first column), one way to elicit contrarian or heterogeneous beliefs is to first articulate the common beliefs or "orthodoxies" that others hold. These are deeply held beliefs or unquestioned assumptions about such things as customer taste or behavior, technology, or any number of other domains: supply chains or structure, governance, the evolution of markets, or future societal trends. Articulating the commonly held beliefs within an industry or market space can help entrepreneurs consider and sharpen what is truly unique or different about what they believe. To offer some brief examples, Steve Jobs famously held the unique belief that personal computers could become a mass market

product; Howard Schultz believed coffee could be sold at a substantial premium; and, in the 1970s, the management of Luxottica—now the world's largest eyewear conglomerate—believed eyewear could be transformed into a fashion item.

Of course, contrarian beliefs are just "talk" unless they lead to some form of practical problem solving and action. Therefore, the second conversation (see the second column of Figure 1) invites entrepreneurs to transform their unique beliefs into well framed problems that need to be solved (cf. Baer, Dirks, & Nickerson, 2013). Put differently, problems can be seen as the obstacles that stand in the way of realizing the contrarian or heterogeneous belief of the startup. Value creation in the theory-based view is fundamentally about finding, formulating, and solving problems (Nickerson & Zenger, 2004)—a process that is initiated by contrarian or heterogeneous beliefs (Felin et al., 2021). This enables the firm to develop a unique causal logic for how to create value. This involves formulating and solving problems unseen by others or solving widely recognized problems in new and novel ways. Again, this conversation involves more than restating a contrarian belief as a problem, but rather demands articulating the central obstacles that stand in the way of making a contrarian belief true.

An alternative framing asks, what must be true—or made to be true—for the entrepreneur to solve the central problem at hand. Often the factors that must be made true are a set of subproblems that need to be solved. To illustrate, Airbnb's initial contrarian belief was that vacant rooms or apartments could be utilized as "hotel" accommodations—a belief that initially was seen as ludicrous (Felin & Zenger, 2017). The core problem for Airbnb was to broker safe, easy, and reliable access to the idle capacity found in privately owned housing. To solve this problem, the founders needed to address several key subproblems: develop an efficient and accessible matching mechanism (matching those seeking accommodation with those willing to offer it), facilitate secure payment, develop trust between complete strangers, and develop an efficient and effective vehicle for onboarding and listing properties that accurately signal the level of quality.

Notice that the process of assembling value is, more often than not, multistage, where different aspects of the theory are tested through different means. Put differently, composing value demands that different actions are used to solve different subproblems which collectively solve some larger problem. Thus, there is no one-size-fits-all approach to how a startup might solve problems or validate a particular solution. Rather, what the startup needs to do is theory-dependent (Wuebker et al., 2023). For example, Airbnb founders—as suggested by lean startup—in fact created what some might term a minimum viable product by renting out their own apartment (Gallagher, 2017).[5] Other aspects of their theory were addressed through different means, for example, by searching for subproblem solutions—like how to promote trust among strangers—which they solved by incorporating an eBay-like rating system. Thus, the eventual test of a theory, and the resulting product or service offering, emerges from different experiments, tests, and solutions linked to individual subproblems with the overall causal logic providing the glue that integrates across subproblems and assembles the actions and resulting value. To offer other examples: for Jobs and Apple, the core problem of generating a mass market personal computer required solving problems related to elegance, ease of use, and reliability; for Luxottica, launching eyeglasses as fashion items required developing a competence in fashion design, composing an ability to market eyeglasses in different countries, and developing a capacity to access and control their retail distribution (Camuffo, 2003). In all, in Column 2 of Value Lab (Figure 1), the aim is to structure the larger

problem by articulating the set of subproblems that the entrepreneur believes must be solved to solve the larger problem. The problem and constellation of subproblems—and their overall causal structure—then becomes both the scaffolding around which a theory is built, and the guidance for actions to test various components of the theory.

The third conversation invites entrepreneurs to transform this articulation of an overarching problem with subsidiary subproblems into an expression of the firm's theory of value. This expression seeks to capture the overall causal reasoning and structure of how value will be created—representing an exercise in causal logic (Pearl, 2009; Pearl & MacKenzie, 2018; also see Heckman & Pinto, 2023). The startup essentially is asked to think about how they might practically "intervene" in the world to create the conditions that enable the creation of the contrarian value that they foresee. Value Lab pushes the startup to create a logical causal diagram that goes from startup-specific beliefs to associated problems (and subproblems) and associated actions (including various forms of experimentation). As highlighted at the bottom of Column 2 in Figure 1, the overall logic of the theory can be summarized as a causal if-then statement that captures the overarching problem and subproblems. To illustrate, this might take the following form in the context of a company like Airbnb: "Airbnb believes that it can broker safe, reliable access to private hotel capacity, if it can generate trust between strangers renting and offering private hotel space, offer secure payment, and provide an effective vehicle for onboarding new properties while accurately signaling the quality of properties." Clearly this expression is not necessarily a version crafted for public consumption, but it lays out what Airbnb believes it needs to make true to solve the problems it seeks to resolve, and thereby compose novel value.

The first two columns of Value Lab—focused on contrarian beliefs and problem solving (and establishing an underlying causal logic of the theory—offer the central foundations of the theory-based view and thus provide a useful contrast with lean startup. Economic value from the theory-based perspective originates from contrarian beliefs—and their pursuit along with associated problem framing and solving—while lean startup primarily emphasizes the rapid feedback from customers. In the third column of Value Lab, entrepreneurs are invited to consider alternative actions to take—actions that test, experiment, and explore solutions to the set of subproblems that must be resolved to solve the larger problem and generate the value that the entrepreneur foresees. This may involve conversations with customers, but also conversations with potential suppliers, resource providers, or other stakeholders (Wuebker et al., 2023). This process also involves identifying resources or technologies that need to be acquired for the hypothesized value to be created, where the theory guides startups to see and recognize solutions to the problems that have been formulated. As we discuss below, part of what the theory-based view of startups reveals is a way to accelerate learning about a theory even before obtaining customer feedback, by effectively matching entrepreneurial actions—including experiments—to the theories entrepreneurs propose. In all, the unique, startup-specific mix of actions (see Column 3 of Figure 1)—types of experiments, identification and securing of resources, and search for solutions—is guided by the cognitive work and theorizing that is done by addressing the previous two columns.

Discriminating Alignment Versus One-Size-Fits-All

The theory-based view of startups is a form of "meta"-theory that does not prescribe or emphasize any one way of validation, experimentation, team building, or governance. Rather, the theory-based view—and a tool like Value Lab—provides entrepreneurs with the

scaffolding to come up with their own theory and startup-specific causal logic, and then to align or "match" the right activities and practices to validate and compose value with that theory (Wuebker et al., 2023). The theory-based view thus takes a page from transaction cost economics (Williamson, 1998)[6] and argues that entrepreneurial actions (including experiments) should be *contingent* on the type of theory and value that an entrepreneur envisions and explores. Our focus on contingency is broadly echoed by Zahra who argues that entrepreneurship research has "overlooked the importance of the contextual variables that stimulate, shape, and define the entrepreneurial act" (2008: 243). In our case, these contextual variables have to do with the heterogeneous beliefs and theories of startups and how different forms of experimentation, testing, and acting enable their realization and the creation of value.

By way of contrast, lean startup tends to push toward one-size-fits-all solutions, at the expense of a more contingent perspective. Lean startup's strong emphasis on customer validation—due to information asymmetry between startup and customer—and the associated prescription of MVPs provides but one example (Blank & Eckhardt, 2023). Other examples can be highlighted. For example, lean startup argues that the idea that startups should engage in "stealth mode" has been made obsolete by the power of quick and transparent customer interaction. As put by Blank, "the lean startup methodology makes [stealth mode] obsolete because it holds that in most industries customer feedback matters more than secrecy and that constant feedback yields better results than cadenced unveilings" (2013: 6). We disagree. From a theory-based perspective, whether a startup should engage in secrecy or not—or any other practice (including the development of an MVP)—is dependent on the nature of the product or value offering that the startup is envisioning. Stealth and secrecy, in some situations, can be vitally important to the ultimate success of a startup, and therefore critical to maintain as a theory is explored and realized (Wuebker et al., 2023; also see Bryan, Ryall, & Schipper, 2022).

The prescriptions of the theory-based view—which experiments to conduct, or which actions to take—are contingent. To illustrate the contingent actions prescribed by the theory-based view, we might return to Value Lab (Figure 1). Specifically, the third column points toward various types of actions that a firm might take to validate, experiment with, execute, and realize various aspects of their theory of value. In other words, once a contrarian or discrepant belief has been developed (see Column 1) a problem (with subproblems) identified, and a theory composed, then startups can engage in a structured process of experimentation, resource identification, or acquisition, focused on solving the problem and subproblems. For example, a multitude of validation methods might be utilized in the realization of a given theory of value. The fashion eye glass firm Luxottica engaged in various forms of preliminary experimentation and actions—before interacting with customers—by observing the success of specific market players (essentially vicariously learning) and acquiring them (Camuffo et al., 2023a). The learning and activities of Luxottica were driven by the firm's overall theory about "fashionable" glasses and the downstream problems—many of them related to vertical integration and different forms of licensing arrangements—which they needed to solve to create value from that theory.

The difference between a lean versus theory-based approach to startups is that the latter does not prescribe a *primary* method of validation, experimentation, or entrepreneurial action. This contrasts with lean startup. Lean startup argues that "while other methods of experimentation are not explicitly excluded, the *primary* methods of testing business theory

in the lean startup" are focused on three ways of interacting with customers, namely: the "use of interviews with potential customers and experts, product testing with an MVP, and customer surveys (Blank & Eckhardt, 2023: 18, emphasis added). The primary methods for testing a theory from a theory-based perspective are more far-ranging and depend on the nature of the theory itself, specifically the subproblems that need to be solved, or the premises that need to be made true. From a theory-based perspective there is no primary method of experimentation, but rather a multitude of methods, including talking with potential suppliers, analyzing relevant technology, thought experimentation, persuading various stakeholders, searching for subproblem solutions (perhaps in other industries), and of course eventually obtaining customer feedback. From a theory-based perspective, the method of experimentation that is utilized depends on what the startup hopes to accomplish and the nature of the subproblems the startup needs to solve.

The problem is that rapidly developed customer-oriented MVPs only cover—and provide seeming validation for—a small and (often) incremental set of products that startups could feasibly create. In terms of creating significant value, startup products and value offerings are more likely to reflect theories involving multiplicative or combinatorial "packages" or bundles of features and unresolved subproblems that cannot meaningfully be validated by customers all at once upfront. The imagined end product often results from a "multi-step" process and overall causal structure that involves formulating problems and subproblems, then searching for solutions, engaging in experimentation, and acquiring the relevant solutions and resources. Some technology solutions might be readily incorporated off-the-shelf, while others require further development and integration. Some aspects of the product or value offering might be validated by a sequence of experiments, for example through A/B testing (aspects that lend themselves to comparing more desirable features: like what color a product should be) or some other form of interaction with customers or other stakeholders.

An entrepreneur's theory guides the orchestration of an overall process of value creation, including the mix of activities and types of experiments that the startup should engage in. Thus, with many startup products and value offerings—particularly ones that are truly disruptive and not merely incremental—there is no immediate MVP or prototype that can be created to enable quick feedback or easy customer validation. In some cases, this might be possible—particularly for a specific aspect of a startup's overall theory—but, in many cases, customers may in fact provide misleading signals rather than useful validation, particularly for products that they simply cannot (yet) imagine using.

All that said, lean startup's emphasis on the need for startups to "learn" is certainly echoed from a theory-based perspective. However, the mechanisms of learning from a theory-based view include a larger menu of options. Rather than jumping by default to quickly develop and test an MVP (or a sequence of MVPs) and thereafter calibrating product market fit, here the learning exercise—as pointed to in the last column of Value Lab—typically involves testing assumptions, searching for subproblem solutions, and evaluating relevant technology or resources that might enable solving critical subproblems. In this sense initial experimentation, search, and learning is not about product market fit, but about determining whether a path to substantiating the contrarian belief—and a path to solving the corresponding problems—is feasible. Again, some aspects of the startup's value offering might be tested with an MVP, amongst a host of other forms of experimentation, solution search, and resource acquisition.

The central point here is that startups need to appropriately "match" their actions with the type of theory they are pursuing, rather than relying on one-size-fits-all solutions. Here we

might think of the entrepreneur as a Coasean (Coase, 1937) "entrepreneur-co-ordinator" who judges what activities to pursue and how and with whom to pursue them. The theory-based view similarly argues that these various activities and practices—whether to engage in them or not, and how—depend on the type of theory the entrepreneur is pursuing. In some instances, targeted feedback from (some) customers might indeed offer a valuable informational signal about a particular aspect of a prospective product or value offering. In other instances, however, customers might merely lead a startup astray. This type of discriminant nuance is essential. In all, the real power of generating a well formulated theory through a tool like Value Lab lies in accelerating the pace at which an entrepreneur learns about a theory's value. A theory provides the roadmap for actions that accelerate learning. In this effort, the theory-based view is not wedded to any particular action or form of experimentation—like the need to focus on immediate customer validation. Of course, these approaches are not ruled out, but their use depends on the nature of the theory a startup is pursuing.

Pivots, Structured Theories, and Revised Beliefs

As emphasized by Blank and Eckhardt (2023), lean startup highlights not just learning from customers but also the need for startups to pivot. A pivot is broadly defined as a change in the direction, strategy, product or value offering of a startup or firm (also see Kirtley & O'Mahony, 2023, Burnell et al., 2023, and Leatherbee & Katila, 2020). Lean startup argues that if early and frequent interactions with customers do not offer validation for a particular product or strategy, then startups need to learn and change, that is, pivot toward something else. The central idea is that faster failure leads to faster pivots—a quicker shift to a more productive path. As put by Blank, startups "that ultimately succeed go *quickly from failure to failure*, all while adapting, iterating on, and improving their initial ideas as they continually learn from customers" (2013: 5, emphasis added).

From a theory-based perspective, learning, changing, and pivoting are also important; however, the central question for lean startup is, how should a startup decide what to pivot toward (or what aspect of the value offering to change, and how)? What does a startup learn from the process of interacting with customers? Might a startup have learned the wrong things from a particular customer interaction? Or, what should happen if a startup's MVP does not receive validation from customers? When responding with a pivot, should the focus be on changes in the customer segment targeted, in the product attributes or mix, in the pricing, distribution, or perhaps the entire business model? Without a theory, a startup is left to the whims of customer feedback or aimless trial and error. From a theory-based perspective, any feedback is informed by a startup-specific theory, thereby providing greater precision for when and what to pivot toward.[7]

A virtue of the theory-based view of startups is that it provides greater precision around what motivates (or should motivate) an entrepreneur's decision to pivot, including an early pivot before a minimum viable product can even be composed. In the theory-based view, early pivots are motivated by an observation that a subproblem is unsolvable or a critical assumption is false. By contrast, lean startup focuses on pivots stemming from failure to achieve product market fit. While the theory-based view acknowledges this important source of pivots, the need to change a theory may become salient long before obtaining product market feedback, because, for example, the entrepreneur realizes that some of the subproblems are unsolvable or some of the assumptions are unsupported. In an important sense, a

well composed theory permits even faster pivoting—pivoting in advance of obtaining market feedback on a product offering or a full MVP. Well-developed theories also enable more informed pivots—or, put differently, more informed revisions to beliefs. By exploring specific assumptions or seeking out solutions to critical subproblems, entrepreneurs examine the causal links or assumptions of their theories (Ehrig & Schmidt, 2022). This form of testing may occur in different ways for different aspects of a product or value offering. For example, Steve Jobs explored possible solutions to the subproblem of ease-of-use and eventually encountered the graphical user interface. Airbnb founders sought out solutions to elevating trust between strangers or arranging for secure payments, and found a useful approach in how eBay and other companies had dealt with similar problems. Luxottica explored different solutions for getting control of the retail network. The identification of these solutions—that is, what made these solutions salient to the entrepreneurs—was only possible given the initial contrarian belief and the formulation of a core problem which motivated the search for these solutions.

In a valuable extension of the theory-based view, Ehrig and Schmidt (2022) argue that entrepreneurs should order their assumptions—those things that must be true or must be made true— based on strength, and then test the weakest premise. When premises or assumptions are unsupported, entrepreneurs must revise their beliefs, ideally by replacing the unsupported assumption with an alternative that preserves the remainder of the causal theory. Only when an alternative cannot be found does the entrepreneur abandon a theory and take up a major pivot.

Within the framework of Value Lab, we view premises and assumptions as frequently taking the form of subproblems to be solved, and thereby made true. For instance, Airbnb's theory is only as strong as its weakest premise—that is, its ability to solve its most intractable subproblem. In other words, the theory falls apart if Airbnb cannot find a mechanism to build trust among strangers who seek to offer or rent private hotel space. Airbnb's theory hypothesizes a path to solving this subproblem. But if the hypothesized approach fails, Airbnb must either find an alternative way to resolve it (a sub-pivot of sorts) and thereby make this assumption true, or Airbnb must revise the theory, finding a new premise or set of premises that will support the overarching conjecture (Ehrig & Schmidt, 2022). As outlined in Value Lab, experiments, data gathering, and resource search all focus on solving subproblems, in support of validating a theory, or facilitating its revision.

Camuffo et al. (2023a) and Camuffo, Gambardella, and Pignataro (2023b) provide a closely related framing. They argue that entrepreneurship necessarily involves making "low-frequency high-impact" decisions—decisions that, because they are rare, cannot rely on past data to guide choice. They argue that theory formation begins with problem framing that includes defining relevant attributes and the relationships that connect them. For example, Luxottica realized that it could move into fashion eyewear from its standard business of eyewear solutions for vision correction. The theory of the standard business was to focus on lowering costs, which lowered prices, raised demand, and generated economies of scale—thereby generating a virtuous cycle of low costs, low prices, and high demand. Since the product was standard, relations with customers could be delegated to carefully managed retail stores. However, the idea of transforming eyewear into a fashion item reflected a new theory. From a potentially wide array of alternative framings about how to create this transformation, Luxottica focused on initiating alliances with fashion brand companies. The

theory was that Luxottica could leverage the competence and brand of these companies rather than compose their own capability. The theory was that these fashion brands could apply their craft to a new domain—eyewear—and create truly original styles. In turn, this implied that Luxottica had to develop direct relations with customers, and this would thus demand integrating forward into retail. Luxottica tested this theory by monitoring small companies in the fashion glass business and by striking an early alliance with Armani. These experiments corroborated that there was a potential demand and mass appeal for higher-end eyewear that was fashionable, and that by building on the style and market of Armani, it could generate demand for Luxottica's new products.

Overall, the theory-based view provides a distinctly different approach to learning—one less reliant on customer feedback and simple product market fit. The theory-based view is informed by experiments that test assumptions and search for subproblem solutions. Through this process, startups revise their beliefs as they learn—guided in the varied actions they take to facilitate learning by a startup-specific theory that points toward testing assumptions, searching for solutions to problems that have been formulated, or discovering critical resources.

Corroborating Evidence and Empirical Research Opportunities

The real validation for any normative theory is whether it works. Specifically, does a particular "treatment"—the advice or set of steps suggested by the theory or approach—actually enable startups to create more value, to engage in better pivots, and lead to better performance outcomes? Thus, next we briefly report on the current and ongoing empirical findings related to the theory-based view of startups, including one study that also directly compares lean startup with the theory-based view.

In a randomized control trial (RCT), Camuffo et al. (2020) randomly allocated 116 Italian startups to a treatment and a control group. Both groups underwent business-related training (eight sessions, every other week). The treatment group was trained to think scientifically by asking entrepreneurs to formulate theories and test them. (Note that this study followed the broad contours suggested by Value Lab, although the study was done prior to the full articulation of the framework.) By contrast, the control group was introduced to standard entrepreneurial tools and logic, such as external market analysis. This same design—with the same treatment and control groups—was replicated with additional RCTs totaling 759 randomly allocated startups (Camuffo, Gambardella, Messinese, Novelli, Paolucci, & Spina, 2024).

These initial RCTs produced three main findings. First, treated startups were more likely to terminate the pursuit of their entrepreneurial idea and were more likely to terminate them earlier. This termination result is intriguing. Treated entrepreneurs recognized earlier, and to a greater extent, that their ideas were in fact not valuable. This saves entrepreneurs—as well as investors and other stakeholders—precious resources and time. Anecdotal evidence from the startups in the training program corroborates this conjecture. Treated entrepreneurs recognized, based on good logical reasoning, why their ideas were not worth pursuing, and they recognized it earlier. Second, treated entrepreneurs pivoted once or twice, whereas entrepreneurs in the control condition did not pivot at all or pivoted many times. This pivoting result is consistent with the idea that when entrepreneurs see that their idea does not work, they know *where* to pivot, in line with the idea that theory-based entrepreneurs make more

informed revisions to their beliefs. Conversely, entrepreneurs in the control group were more inclined not to change their idea, or to pivot rather "indefinitely," in an aimless search for an alternative path to creating value. Without an underlying logic—or theory—that explains why their idea is not successful, they do not see how to remedy it by pivoting to a revised, better theory. Third, and finally, treated entrepreneurs obtained larger revenues and performed better, conditional on remaining active. This is consistent with the idea that a tighter theoretical focus can support a superior ability to discard false positives, and that more informed pivots improve performance results.

Further corroboration has come from the work of Novelli and Spina (2022). Their study included both new firms as well as more established, small organizations (with less than 10 employees) in a randomized control trial. Firms in the treatment group were encouraged to develop a theory with hypotheses that solved a problem. The control group, on the other hand, was simply exposed to generic strategy frameworks and testing techniques. Treated firms grew more quickly (in terms of revenue) than the control group, but the effect was more pronounced for more established small firms relative to newer startups. Qualitative evidence suggested that the treated group better understood when some of their beliefs were unsupported or that some of the problems (or subproblems) could not be solved, and therefore necessitated a pivot. While not a direct comparison of normative guidance from the theory-based view versus lean startup, the findings are nonetheless consistent with the importance of firm-specific theories when exploring and realizing new and contrarian ideas.

Finally, Agarwal et al. (2023) adopt a more elaborate research design that aims to explore the impact of a theory-guided approach versus a purely evidence-based approach, more consistent with lean startup. They studied 150 Tanzanian entrepreneurs randomly allocated to two training programs (six sessions, every other week). In one training program entrepreneurs were trained to formulate theories about their business based on causal links (identifying causes and effects) and test them via hypothesis development. In the other training program entrepreneurs were trained to find evidence for hypotheses, focusing on creating a minimum viable product and receiving feedback from customers. This study thus offers a relatively direct test—though preliminary—of the theory-based approach versus lean startup. The entrepreneurial firms treated with the theory-based approach attained significantly higher performance metrics, including higher revenues and higher profits, compared to the firms in the control condition which received the lean startup treatment (which was included in the control condition). The RCT also found that when the theory-guided entrepreneurs choose to pivot, they change more elements at the same time. That is, they adopt a more holistic approach to the business reflecting a broader, theory-informed perspective of what they need to do and test, and what they should aim at (and pivot toward). Entrepreneurs in the purely evidence-based training only changed single elements.

Most of the empirical work within the domain of "entrepreneur as scientist" is relatively recent. Some of the above RCTs offer early evidence that teaching entrepreneurs to be theory- and science-based improves performance outcomes (above and beyond basic business training) and leads to better performance as well as more informed experimentation and more focused pivots (Camuffo et al., 2021). However, Lean startup has of course also received empirical support from RCTs (Kotha et al., 2023). Our hope is that the varied approaches that focus on introducing the scientific method to startups can be studied comparatively, side-by-side, to understand the respective virtues and limitations of each approach.

Various entrepreneurial frameworks—such as the theory-based view, lean startup, effectuation, and discovery-creation—can each offer and put forward their respective treatments and methods for comparison. Various RCTs and empirical studies have suggested different types of treatments for startups, highlighting how interventions such as formal advice from peers (e.g., Chatterji et al., 2019) and specific types of business training (Kotha et al., 2023; also see Santamaria, Abolfathi, & Mahmood, 2023) can improve decision making and startup performance. While different forms of intervention are feasible, we argue that a theory-based approach to these interventions—that is, training startups to develop their own theory of value—will yield the best results. This of course is an empirical question, and thus further work is needed to corroborate this claim. More generally, we hope that future work can design and run explicit "horse races" between the varied proposed treatments and methods—like the theory-based view and lean startup (among others)—to discover their relative virtues and comparative implications for startup performance and value creation. Since intervention-oriented work (like RCTs) are a relatively new method within the domain of entrepreneurship and strategy, these types of comparisons have yet to be performed, although this certainly offers an important direction for future work.

In comparing different theories of startups and entrepreneurship, it is important to recognize the issue of contingency. That is, it might be that the value of different prescriptions and normative interventions is a function of the types of settings, types of outcomes, and types of startups that a given theory is focused on. Lean startup's focus on customers certainly lends itself to value creation in settings where rapid learning from customers makes sense; but, in other situations—for example, where products are more complex or require substantial investment—customer feedback might not be as effective as other forms of validation. Thus, we see a need to develop contingent arguments that outline different theory types or forms of value creation, in order to explore which are best matched with varied types of validation, experimentation, and forms of governance (Wuebker et al., 2023). Importantly, comparative work like this can begin to establish the respective boundaries and contingencies of various approaches to entrepreneurship, delineating when and why certain approaches work. This type of research would offer extremely valuable insights and inform what is taught at universities, various training programs, accelerators, and incubators across the world. Furthermore, it would enable scholars to establish the boundary conditions of each approach, and enable the development of a more nuanced, contingent approach to entrepreneurship.

Before concluding, we offer some conciliatory, integrative thoughts. While we have highlighted a number of differences between lean startup and the theory-based view, there is certainly room for a heterogeneity of approaches when it comes to understanding something as complex as startups, strategy, and value creation. After all, a theory, by definition, cannot explain everything. Like maps, theories and models aim to provide focused representations of complex phenomena, rather than fully mirroring reality. Each theory provides a map of what it sees as important—simplifying and distilling key patterns rather than incorporating every detail. Different camps and schools of thought—within the domain of entrepreneurship and strategy—make different things salient, each offering a unique "lens" that focuses awareness and attention on certain phenomena. This is why we think there is power in moving toward a "contingent" approach with regard to a more scientific approach to startups, where contingencies and boundaries of different tools and approaches are recognized and appropriately utilized.

Conclusion

In this paper, we contrast the theory-based view with lean startup, in an effort to point toward a "scientific method" for entrepreneurship. We laud lean startup for its normative engagement with entrepreneurial practice and its call for a more scientific approach to startup activity. The theory-based view shares this agenda. However, while both approaches argue for a scientific approach to venture creation, they diverge in their underlying mechanisms and practical guidelines. In this paper we question the strong emphasis that lean startup—as outlined by Blank and Eckhardt (2023)—places on the information asymmetry between entrepreneurs and customers, bounded rationality, and the associated emphasis on customer validation (through MVPs and rapid, frequent feedback from customers). While customer feedback can be important *in some situations*, we highlight how it is far from a panacea. By way of contrast, the theory-based view emphasizes the role that contrarian or heterogeneous beliefs and theories play in shaping startup-specific experimentation, resource acquisition, and problem solving. We emphasize the need for discriminating alignment when it comes to entrepreneurial action, where one-size-fits-all tools yield to a recognition of the importance of contingently matching different activities, forms of experimentation, and practices with what entrepreneurs seek to accomplish. Our hope is that further theoretical and empirical work on the respective similarities and differences across different approaches to entrepreneurship will enable scholars to develop normative models that help startups improve their decision-making and performance outcomes.

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Notes

1. Even if large-scale customer feedback and data is secured or is somehow available, it is unclear how a startup might (statistically or otherwise) aggregate all this information and use it for scientific validation. Should startups utilize and focus on the modal, average, or some other form of aggregate customer response? For example, if *many* customers say that a particular feature is needed, does this provide the evidence, informational signal, and scientific validation needed to include that feature? It may or may not. It is easy to mistake frequency with validation and evidence. It could be that just one customer, amongst dozens or even hundreds, offers a much-needed insight for the development of the product offering or a certain feature. But there would be no way to identify this particular customer insight, as startups might naturally focus on more-frequently mentioned points of feedback. In other words, some mechanism is needed to identify or recognize—amongst a vast set of possible responses—those insights that might be most valuable. This is why it is critically important to correctly specify the right form of experimentation and validation upfront.

2. We do not mean to imply that lean startup is "playing catch-up" to the theory-based view. Rather, the emphasis of each approach simply has been on different issues—which provides the focus of this article. These two literatures were developed roughly contemporaneously and independently. Early work on the theory-based view was published in 2009 (Felin & Zenger, 2009), including links to the problem-solving perspective (Nickerson & Zenger, 2004). Ries's influential and widely-used book *Lean Startup* was published in 2011. And Steve Blank of course did important, earlier work on customer development and lean startup.

3. Of course, one of Jobs's most famous subproblem solutions involved leveraging technology being developed at Xerox Parc. While the common narrative is that this was a rather serendipitous solution discovery, in truth Apple engineers were well aware of many details of the technology being developed at Xerox, and Jobs's visit to Xerox Parc was preceded by Xerox being granted the right to purchase an equity position in Apple in exchange

for revealing its technology (see https://web.stanford.edu/dept/SUL/sites/mac/parc.html#:~:text=Finally%2C%20as%20several%20authors%20have,already%20going%20on%20at%20Apple).

4. We recognize that there are extant debates about the right econometric, statistical, and computational tools for understanding causality (Heckman & Pinto, 2023; Pearl & Mackenzie, 2018). Our emphasis is on the need for startups to develop their own, firm-specific and unique causal logic for how they imagine creating value—which, in turn, can then guide their downstream choices for potential measurement, experimentation, and evidence-gathering. We suspect that managerial practice will offer unique insights and tools to also address questions of causality within the domain of economics and management science.

5. Thanks to one of our editors for pointing this out.

6. The idea of discriminating alignment is aptly captured by Williamson as follows: "transactions, which differ in their attributes, are aligned with governance structures, which differ in their cost and competence, so to effect a (mainly) transaction cost economizing result" (1998: 37). The central variable of discriminant alignment within the theory-based view is focused on heterogeneous beliefs and theories. That is, the theory-based view of startups starts with the premise of heterogeneity in beliefs or theories and the need to appropriately "match" (or discriminately align) them with the right forms of experimentation, funding, governance structure, team building and human capital, and so forth (Wuebker et al., 2023).

7. Precision pertains to the idea that actions have to do with whether particular solutions, experiments, or resources in fact solve a formulated problem or not. Actions ultimately originate from beliefs which shape the formulation of problems, and if the right solutions cannot be identified, then startups can update their beliefs accordingly.

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Who Learns Fastest, Wins: Lean Startup and Discovery Driven Growth

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Most entrepreneurial ventures fail. Most corporate ventures fail too, often more expensively. Against this backdrop, Lean Startup and Discovery-Driven Growth (DDG) are methods that emphasize rapid learning, resource parsimony, and an intense focus on validating assumptions as ways of reducing the cost and risk of failure. Lean Startup had its roots in and makes a contribution to entrepreneurship; Discovery-Driven Growth emerged instead from the study of corporate innovation efforts. Both acknowledge that planning methods based on low-uncertainty situations fall short when faced with high-uncertainty contexts. DDG suggests five design steps that interact: defining success, checking for realism, defining operations, documenting assumptions, and planning through checkpoints. Similar to Lean Startup, it emphasizes an experimental approach to learning. Different than Lean Startup, it is less prescriptive about the method and embraces wider uncertainties than Lean Startup's focus on product-market fit. In a context that has been described as an "innovation arms race," both methods are a major advance over traditional planning processes because they both emphasize rapid learning. As is rapidly becoming clear, in more and more parts of the evolving digital economy, whoever learns the fastest wins.

Keywords: *corporate venturing; entrepreneurial/new venture strategy; innovation management; organizational learning; real options theory*

Introduction

Economist William Baumol identified the defining feature of the "growth miracle" of modern capitalism as the presence of a "ferocious innovation arms race" between firms in which "the prime weapon of competition is not price, but innovation" (Baumol, 2002: ix).

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As he puts it, "what differentiates the prototype capitalist economy most sharply from all other economic systems is free-market pressures that force firms into a continuing process of innovation *because it becomes a matter of life and death for many of them* (viii, emphasis in the original). In his view, entrepreneurs have a role to play in contributing to critical technical breakthroughs and other stimuli to growth, but to understand overall economic growth, one needs to take into account both their activities and the activities of established firms who seek to ensure their own well-being over the long run.

And yet, successfully leading innovation efforts is a fraught process. Success is rare. Most new ventures fail. Most new ideas will not see commercial success in the marketplace (Stevens & Burley, 1997). Startups fail when, as Blank and Eckhardt point out, they run out of money before they have demonstrated valuable product-market fit. Corporate ventures, having no such discipline imposed upon them, often fail far later in their development and cost vastly more amounts of money (Blank & Eckhardt, 2023; Block, 1982; Cauley, 1999; Sykes, 1986). Enthusiasm for internal corporate venturing waxes and wanes in a way that is difficult to explain. This creates a fascinating tension. On the one hand, the importance of systematic innovation for both societal and corporate well-being is understood. On the other, it seems devilishly difficult to manage on a consistent basis (Burgelman & Valikangas, 2005).

A core reason for this difficulty is that pursuing new ventures inevitably involves navigating through uncertainty, when the range of possible outcomes simply can't be known in advance. This in turn implies that learning is logically essential for success. And yet, the most widespread practices for developing new ventures, whether they are corporate ventures or startups, do not emphasize learning and discovery and presume a level of certainty that is unrealistic.

In the case of business school entrepreneurship classes, we have the centrality of the business plan (Rich & Gumpert, 1985). As Blank and Eckhardt note, business plans often include not only evidence of customer acceptance but also extensive emphasis on the organization that an entrepreneur will be building, right at the inception of the venture. Rich and Gumpert, for instance, suggest incorporating five-year forecasts of profitability in a plan. A similar pattern can be observed in plans for corporate ventures in which every plan, on paper, overcomes some established hurdle rate, offers to provide a return-on-investment calculation, and often incorporates meticulously developed spreadsheets as back-up assurance to decision-makers that the innovators have thought through exactly what the fledgling business will require.

Both Lean Startup and Discovery-Driven Growth methodologies are methods that emphasize rapid learning, uncertainty reduction, and the minimization of cost and risk, particularly at the earliest stages of a new venture. This essay will explore the similarities and differences between the two approaches and suggest how the adoption of either (or both) can accelerate the process of discovery that is so central to both innovation and entrepreneurship.

High-Certainty Methods Don't Work in High-Uncertainty Situations: The Flops File

Surprising Stories from the Corporate Graveyard

Discovery-Driven Growth was born out of a fascination with massive corporate failures (Edmondson, 2011; McGrath, 1993a, 1999). Not the quiet, common-or-garden ones but the major flops: the ones that, in addition to costing their parent companies a fortune, also

embedded hubris, pride, bet-the-company swashbuckling, heedless risk-taking, and a drive for breakneck growth at all costs; the ones promoted by otherwise well-managed and competent firms, such as Disney, Citigroup, and Federal Express. The behavior that drove those expensive failures then continues to drive expensive failures today.

NewTV, a venture described as potentially not needing to use the Lean Startup methodology by Blank because of its more-than-adequate funding (Blank, 2018) became Quibi, a short-form video venture that ended disastrously despite having literally billions in resources to spend. Drinkworks, a joint venture between Keurig and Anheuser-Busch, was unceremoniously discontinued in December 2021, despite management making big announcements about a national rollout earlier that same year. Zillow's executives learned, painfully, that algorithms don't offer a competitive advantage in the home-flipping business. Google abandoned its gaming venture, Stadia, after spending many millions. Disney announced that it intended to shutter its effort to create an immersive *Star Wars* experience, the Galactic Starcruiser hotel, mere months after its splashy post-pandemic opening.

At first, it seems quite astonishing that otherwise well-managed, profitable, successful organizations would back massive projects that would turn out to be doomed. And yet, when one compares them, there is an eerie similarity to the management and decision-making approaches.

Planned as though they had facts rather than assumptions. Each of these ventures were planned as though the venture leaders had a great deal more knowledge than they did about what the future would hold. Zillow's "risk-taking" CEO, for instance, wasn't worried at all that algorithms might not give it an edge in the home-flipping business, although the assumptions behind this confidence had never been tested (Rawlins, 2020).

Built a big organization before finding product-market fit. All these projects did what Blank and Eckhardt suggest puts them on a glidepath to oblivion—building up an organizational structure (with accompanying investment) before achieving evidence of product-market fit. Stadia, for instance, had a hugely expensive team of developers right from the beginning. There were more than 150 whose jobs were suddenly axed when the project's closure was announced (Valentine, 2022).

Monolithic, single-path plans that did not incorporate learning. In each of these cases, the plans for the offerings didn't incorporate the possibility of a change in direction. Project teams picked one path to success and built the plan as though the future they envisioned was inevitably going to appear. Drinkworks, for example, made an early decision that their cocktail pods would include both flavor mixer and the alcohol that went with the drink. This choice landed them in a massive regulatory and compliance tangle, as alcoholic beverages are regulated differently by different states, with many requiring strictly limited hours and access. That choice not only severely limited how the product could be sold but vastly increased the cost and complexity of distribution. A startup competitor with a similar concept, Bartesian, instead sells only the flavoring agents, drastically simplifying its path to market.

Impossibly short or excessively long timeframes. Progress on virtually all of these projects was not judged on the basis of checkpoints or milestones but rather on projected launch or market-facing dates, often those that were either too optimistic (usually to "sell" the project internally) or too long. Offering unrealistically short times to achieve results is all too human, but it can set a team up for failure when this becomes the expectation by which venture performance is judged (Rogers & Christensen, 1997). Long timeframes are even worse. As Bent

Flyvbjerg points out, the more time between beginning a project and completing it, the more time for things to go wrong, or as he puts it, creating a big window for black swans to fly through (Flyvbjerg & Gardner, 2023). Disney's Galactic Starcruiser initiative spent reportedly over a *decade* in development and cost the company some $400 million (Kelleher, 2023).

Leaders personally and publicly associated with a given project path. When a leader's ego is mixed up with the progress of a project, watch out! This is a key reason why projects that are obviously off the rails are allowed to progress (Staw & Ross, 1987). Motorola's epic failed low-earth-orbit satellite venture, Iridium, for instance, was directly associated with CEO Chris Galvin's ambitions for it (Cauley, 1999). More recently, Mark Zuckerberg's drive for the company Meta to be a dominant force in the metaverse (a blend of digital and reality-based experiences) has cost the company at least $34 billion, according to some sources, with few signs that this situation is going to be turned around (Morris, 2023).

To answer Blank's own 2018 question of whether having virtually unlimited resources meant that the Lean Startup was unnecessary, the principles behind Discovery-Driven Growth and the Lean Startup are not dead at all (Blank, 2018). In practice, whether it is corporate ventures or well-funded startups, not very much has changed since McGrath started writing about the phenomenon in the '90s. Both Discovery-Driven Growth and Lean Startup take a different approach, which, if followed appropriately, avoids these failure patterns. Since Lean Startup is described in detail by Blank and Eckhardt, Discovery-Driven Growth will be the focus here.

Discovery-Driven Growth Challenged Business Planning Assumptions

Discovery-Driven Growth (DDG) was introduced originally as "discovery-driven planning" in a *Harvard Business Review* article published in 1995 and was expanded upon in the books *The Entrepreneurial Mindset* and *Discovery Driven Growth* (McGrath & MacMillan, 1995, 2000, 2009). At the time, it was considered a novel, even radical, approach to planning for new ventures. Clayton Christensen enthusiastically endorsed it as a key way for organizations to manage innovation, calling it "one of the most important management ideas, ever." (McGrath & MacMillan, 2009). It was cited as a key methodological tool in his influential 1997 book *The Innovator's Dilemma* (Christensen, 1997). It is widely recognized as a core concept in both the innovation and entrepreneurship literatures.

The concept challenged taken-for-granted assumptions about business planning at the time. Conventional theories of strategy emphasized competitive positioning as a key to success. DDG suggested instead coming up with a uniquely differentiated approach to the market. Conventional plans were written as though they contained facts. DDG reminded planners that the best they had to work with were assumptions. The authors of conventional plans tried to be right. DDG suggested that was simply foolish—instead, the objective of planning in a novel context was learning. Conventional disciplines of business planning emphasized discounted cash flow and net present value analysis. DDG suggested instead that option value mattered more. Conventional plans calculated every step necessary for market introduction in advance. DDG proposed instead that planning should be done in short timeframes, focused on the next step in a learning journey. In conventional plans, failure was a highly negative outcome. DDG instead insisted that failure was not only useful but could be conceived of as a taken-for-granted and even necessary part of the entrepreneurial process. Conventional

financial tools were "innovation killers." DDG could be an antidote (Christensen, Kaufman, & Shih, 2008; McGrath, 1999).

Discovery-Driven Growth: The Methodology

The basic methodology of discovery-driven planning, a key part of Discovery-Driven Growth, shares key elements with the Lean Startup approach—specifically its emphasis on learning, hypothesis testing, limiting investment in the early stages, engaging customers in the learning process, and using models or prototypes to gauge customer interest in product features. Discovery-driven planning is consistent with Sarasvathy's 2001 notion of "effectuation" as a crucial process for entrepreneurial action (Sarasvathy, 2001). The principles of effectuation are to start with what means one has, to limit risk, to partner early with key stakeholders, to be open to disconfirming information, and to use an emphasis on shaping outcomes rather than simply reacting to them.

A discovery-driven plan goes through five design steps, all of which are interactive and iterative. First is defining what success might look like and creating a reverse income statement. Second is testing whether the plan is feasible, given these assumptions; this is called imposing the discipline of the market. Third is specifying, operationally, what the business would have to do to accomplish its goals. Fourth is documenting the assumptions underlying the plan. Last, and this is where Discovery-Driven Growth and Lean Startup practices are very similar, is planning to learn by structuring learning events around key checkpoints or milestones. Unlike Lean Startup, a discovery-driven plan might continue to test assumptions well into the "company-building" part of the process. Lean Startup is also more prescriptive about its checkpoints—positing the sequence of customer discovery, customer validation, customer creation, and company building as its overall approach. Discovery-driven plans might begin at a different point of uncertainty and wander considerably from this prescribed course.

Step 1: Defining success (combating cognitive bias and fast, sloppy thinking). Problems often begin with ventures right at the outset. Entrepreneurs or venture leaders simply assume the existence of future revenue streams. This often takes the form of "the market for product or service X is projected to grow by 3000% in the next 5 years, and all we need to do is capture 2% of that market." Unless one is as gifted as Jeff Bezos or Elon Musk and has the talent to convert such a projection to action, such wishful thinking assumes away what will be required to capture that revenue (Kirby & Stewart, 2007).

A further common issue is what Sahlman and Stevenson have called "capital market myopia" in which the opportunity may well be an attractive one, but so many ventures chase it that their projections of obtainable shares are completely unrealistic. They call this the inability to anticipate the individual implications of collective action (Sahlman & Stevenson, 1985).

A third common problem is psychological. As Kahneman and Tversky have found, people systematically understate how much time or resources given projects are going to take, meaning that even a venture that shows promise is likely to be delivered late at far more expense than was planned (Kahneman & Tversky, 1979). Bent Flyvbjerg has made the same observations about the vast majority of mega-projects that go seriously wrong in delivering promised benefits on time and on budget (Flyvbjerg & Gardner, 2023).

Discovery-Driven Growth, in contrast, suggests that before even starting on a venture, it makes sense to establish what success could be and work backward to see if this is even

feasible. A venture's goal, theoretically, is to achieve "entrepreneurial rents." This means that the profit from a new combination of things exceeds the cost of the resources necessary to create it (Rumelt, 1987). What a discovery-driven plan asks the entrepreneur to do at the very outset is to offer some quantification of this outcome. What must success for this idea look like?

In other words, rather than vague notions of "really big" numbers, DDG asks that a specific outcome—in terms of profit, new market creation, impact, or other—is articulated. The next task is to identify a unit of business (or impact). Using these two variables, one can calculate how many units of impact would be necessary to sell or fund to generate the required outcome. For a for-profit business, this calculation is called a "reverse" income statement in which the top-line input is required success and the resulting calculations spell out what the implications of that success are.

Step 2: Impose the discipline of the market. The next step in the process is to pressure-test the logic of the reverse income statement. Does it imply that one must capture an unrealistic share of a market? Or that every single customer in a given geography must become a customer? Or that every customer must be willing to spend 75% of their disposable income on the offering? At this stage, a good many ideas are revealed to be wildly unrealistic.

This part of the method is core to avoiding the fundamental issue that contributes to the disastrous flops that provided the inspiration for the technique. When uncertainty is high, little is known, and much must be assumed. Doomed ventures proceed as though the assumptions made by their proponents are correct. Both Discovery-Driven Growth and Lean Startup place a strong emphasis on testing hypotheses and validating assumptions (also central to the discovery techniques in *Business Model Generation* [Osterwalder & Pigneur, 2006]). Many a plan will be rejected as this stage as being unrealistic.

Creating and continuously updating a reverse income statement is a practice that is quite different in DDG than in Lean Startup, as it continually works backward from a definition of success to what the business must be able to deliver to be viable. To illustrate, let's take the example of the unfortunate Drinkworks project (McGrath, 2022). Briefly, Drinkworks was a venture based on the assumption that there would be huge demand for an at-home cocktail maker, with the presumed customer being someone who wanted to make fancy cocktails at a party or other event without having to go out. The business model had two components: the sale of a Drinkworks machine and the sale of single-use cocktail pods, which would be ongoing. The venture launched in 2017 as a joint venture between Anheuser-Busch and Keurig Dr. Pepper. It debuted in local stores in St. Louis in 2018.

Without knowing much more, one could see trouble brewing (no pun intended!). As their CEO Nathanial Davis said, proudly, at the time the product was launched, "We've got scientists, chemists, process engineers, and so on. . . . There's lots of research and development, lots of technology" (Shaw, 2018). In other words, a large team, expensive talent, a lot of up-front investment, and no early validation of the business concept.

Let's define a hypothetical statement of success, which implies required revenue, the starting point for the reverse income statement. As of 2021, Anheuser Busch had revenue of about $15.59 billion. Keurig Dr. Pepper's revenue was $11.62 billion. Together, that adds up to $27.21 billion. Here is the classic problem of large companies. For any internal venture to be considered successful, it must add a meaningful chunk of revenue to the parents' bottom line, and the larger the firm, the more difficult it is to find opportunities that large.

Let's say that the Drinkworks initiative, to be material to the two parent firms, must have the potential to generate an increment of 5 percent of revenue. That translates into $1.36 billion. If we assume that 50% of that amount has to come from machine sales every year, at $299 per machine, that implies sales of 2.3 million machines each year. If we further assume that the other half of revenue has to come from pod sales, at a price of $17.99 for a 4-pack, that means sales of 37.8 million packs, again, every year (or over 151 million individual drinks).

A November 2021 article reported that the "cocktail platform" was selling 250,000 cocktails a month as of that time (Doering, 2021). That means 62,500 four-packs a month, or 750,000 per year. For the platform to deliver to the hypothetical target, they would have had to see progress that could increase sales 30- to 40-fold! Someone must have finally done the math. After 4 years, and one can only imagine how much investment, the companies announced the immediate cessation of the business on December 1, 2021. Sadly, the very website Drinkworks.com is now available for sale.

It is the disciplined, continuous testing of what is being learned in the venture and validating whether it can achieve its strategic objectives that DDG requires. Note that unlike Lean Startup and business model canvas frameworks, DDG forces internal consistency across various venture elements because they are all interconnected—a slipup in one element shows how the overall model is affected. Further note that Drinkworks *did* discover product-market fit, just not for a big enough market to deliver strategically relevant results for its parent firms. It is also interesting that Bartesian, an entrepreneurial startup, is thriving and growing rapidly. So too is a similar idea, the Bev, manufactured by Black & Decker. The concept, in other words, demonstrated product-market fit but in insufficient quantities to satisfy the growth needs of a large corporation, a factor that the Lean Startup does not address.

Lean Startup does not impose the requirement of defining success up front on a venture—instead the vision of whether a venture will be worthwhile emerges somewhat later in the process. It also does not check for the presence of factors such as capital market myopia—after all, there are many sectors in which product/market fit is found, but there is so much competitive entry that any chance of a profitable outcome evaporates. The travails of mattress-in-a-box company Casper is a case in point (Cheng, 2019; Valinsky, 2020). By the time the once high flying direct-to-consumer startup launched its ill-advised initial public offering, there were 175 companies in the mattress-in-a-box business. As it's beleaguered CEO told a reporter in 2023, "We're not in the business of not making money anymore. VC money is not falling from the ceiling anymore; we need to be very specific on what we're working on. And so, moving from being a lifestyle brand—being sort of the Nike of sleep, selling to everybody—to "We are a mattress retailer." (James, 2023)

Steps 3 and 4: Defining the operations specification and documenting assumptions. The next two steps are to work through, as best one can, what would need to be operationally in place for the desired outcome to occur, as in what would have to be true for this idea to work. What will the proposed business model look like? In this part of the process, DDG draws on the idea of key metrics (often derived from Porter's concept of a value chain; Porter, 1985) to flesh out questions, such as "How many transactions per hour does this imply?" or "How much warehouse space might be necessary?" This is summarized in a document called an operations specification. These numbers can further be fed into the reverse income statement and continuously checked for common sense.

Just because the numbers are in some kind of spreadsheet does not magically turn them into facts. They are, instead, still assumptions. The DDG methodology requires that the assumptions be articulated and documented. This allows them to be made visible to the entrepreneurial teams working on the venture, with the understanding that the job of the planning process, in the early stages in particular, is to convert assumptions into facts as quickly and cheaply as possible.

Step 5: Plan to checkpoints. The final step in creating a discovery-driven plan is to design the plan not with a massive drive to some kind of finish line. Rather, one is pushing to the next learning event, called a milestone or checkpoint (Block & MacMillan, 1985). At the checkpoint, some activity occurs that will provide greater clarity about whether the assumptions in the plan, the business equivalent of a hypothesis in a scientific experiment, appear to be supported. At each juncture, the relations between what would have to be true to be successful and the emerging evidence gathered are continuously tested. This provides the underpinning for understanding whether one is indeed likely to be gaining access to rent streams from the activity.

To execute a discovery-driven plan, one proceeds from checkpoint to checkpoint, assessing the plan's validity at each one. At the conclusion of each checkpoint event, there is a checkpoint review meeting, similar to an after-action-review (Sullivan & Harper, 1997). At this review, the team evaluates whether the idea should be redirected (the famous "pivots" of the Lean Startup), accelerated, simply continued, or stopped, leading the team to exit the project and disengage from it. This opportunity to exit reflects the sensibility of real options—having begun the plan does not mean that one will be necessarily bringing it all the way to conclusion.

Why Humans Get Assumptions So Wrong—Heuristics, Biases, and More

One could, and many have, written treatises on how human bias, based on assumptions, gets people into trouble. We turn assumptions into facts in our minds. We allow our preferences to cloud our objective judgment. We take in information that confirms what we already believe to be true and fail to heed information that conflicts with our preexisting beliefs. We over-rely on vivid and recent examples. The very way in which choices are presented to us influences our decisions, even without any rational basis for this. We engage in "fast" thinking when what we want is what Kahneman calls "slow" thinking. We succumb to groupthink. We provide unrealistic numbers in the hope that our projects will be approved, our investors will invest, and our partners will agree to ally with us. We are totally unrealistic about how long things will actually take. And the list goes on (Flyvbjerg & Gardner, 2023; Janis, 1972; Johnson, 2022; Kahneman, Slovic, & Tversky, 1982; Tversky & Kahneman, 1986).

Both Discovery-Driven Growth and Lean Startup force teams to counter—to the extent possible—these inevitable biases as they are formulating their plans. Several of the techniques from the Lean Startup, including specifying assumptions and regularly testing them, are similar, as is Blank's famous admonition that "there are no answers in the building."

In a discovery-driven plan, it is recognized that failure is not only inevitable but essential to the learning required to create a new business. As Sim Sitkin lays out, what we are after here are "intelligent" failures (Sitkin, 1992). These are failures taking place under conditions of genuine uncertainty, in which "small losses" can be incurred to learn, and in which the causal reasoning behind the failure can be worked out, so that the failure need not be repeated

another time. What both techniques lead the entrepreneur to do is to prompt potential failures, to pressure-test assumptions, and discover which are not valid as early and quickly as possible. An important aspect of both Lean Startup and Discovery-Driven techniques is that the teams using these methods have high degrees of psychological safety (Edmondson, 1999, 2023). Once hiding failures, blaming others, or refusing to face reality enter the picture, the quality of the planning process degrades.

The iterative, learning-oriented progress made on new ventures is central to both DDG and to the Lean Startup. DDG further suggests that having identified what must be true, and having worked backward, critical assumptions—absolutely with respect to product market fit but also concerning other critical variables—should be tested. It is worth mentioning also that while Lean Startup tends to be used primarily as an entrepreneurial development tool, DDG has been deployed in many other situations in which planning under uncertainty is the primary challenge (MacMillan & Thompson, 2013).

The analysis of value creation in Discovery-Driven Growth draws directly from the theory of real options (Dixit & Pindyck, 1994; Hamilton, 2000; Kester, 1984; Kogut & Kulatilaka, 2001; Luehrman, 1998; McGrath, 1997; McGrath & Nerkar, 2004). A real option, unlike a financial one, is a small investment a firm makes in the present that allows it to make future choices when more information is available. By making commitments and executing plans only as far as existing knowledge suggests makes sense, a firm can accomplish several things. First, it can limit risk, as the resource commitment required to address a checkpoint event can be known and contained. Essentially, one can truncate the downside of a future financial distribution of outcomes. Secondly, because inherent in the design of checkpoints is the option to exit, a firm is not committed to the entire investment necessary to complete a project; it can simply stop or redirect its efforts. Third, explicitly holding checkpoint review meetings forces participants to document what they are learning, providing potentially valuable insights for other projects. Finally, by acknowledging that a project may stop, real options theory offers a way to limit downside exposure or risk. A final benefit of investing with an options mindset rather than a conventional planning mindset is that research suggests the highest return on investment in innovation stems from projects targeting the highest uncertainty opportunities (Nagii & Tuff, 2012).

Discovery-Driven Growth shares with Lean Startup commonalities in addressing human mental foibles and facilitating learning. Its origins, however, are quite different. Lean Startup emerged from Steve Blank and Eric Reis's struggles to find the right building blocks for creating startups, with further integration into tools developed by Osterwalder, Pigneur, Tal, and Gruber (Blank, 2013; Blank & Dorf, 2012; Gruber & Tal, 2017; Osterwalder & Pigneur, 2006). Discovery-Driven Growth, in contrast, came from the world of internal corporate venturing. Before comparing and contrasting the two approaches, let's have a look at the theoretical origins of Discovery-Driven Growth.

The Resource-Based View of Strategy and Discovery-Driven Growth

The "resource-based view" (RBV) of a firm, or the "dynamic capabilities" view of strategy from which DDG emerged, has a different starting point from Lean Startup. The Lean Startup model presumes that an organization does not yet exist, therefore the primary goal of the process is to search for and identify a repeatable, scalable business model. As Blank

himself has often observed, startups are not just smaller versions of an established business; they are vehicles designed to search for product market fit. An established firm, in contrast, has already built a reliable, sustainable business model, meaning that it has people, assets, culture, processes, and other resources already engaged in the process of generating profits. The presumed starting point of the two models is thus quite different. Nonetheless, their goals are quite similar. Both types of firms need to find new, repeatable business models, but established firms need to do so in the context of assets that are already deployed to do other things.

The presence of existing capabilities means that, as Levitt and March point out, companies can develop competence traps. Such a trap occurs when a firm or a group within an organization develops firm-specific competencies at using a particular methodology or competency. A superior technology or method then requires people in an existing firm to give up on or lose all of that capability in order to engage in a new learning curve to adopt a new one, leading to understandable reluctance to adopt a new one (Levitt & March, 1988). This is why we're still using QWERTY keyboards, even on the supercomputers readily available in peoples' pockets (David, 1985).

A similar observation has been made about entrepreneurs engaging in the search for new opportunities; they can be trapped by what Gruber, MacMillan, and Thompson have called "prior knowledge corridors," which can lead them to inadequately explore new opportunities with which they have no previous experience. This academic research eventually led to the development of the opportunity navigator, which became a central part of the Lean Startup, guiding people to explore more attractive new opportunities than their prior understanding might have led them to (Gruber, MacMillan, & Thompson, 2013; Gruber & Tal, 2017). This is an attempt to counter a risk with exploratory techniques that learners settle on locally satisfactory solutions rather than digging more deeply into alternatives that might even be more attractive (Levinthal, 1997). This is why it is valuable to understand how firms search for new opportunities for growth.

Edith Penrose's description of the process through which established firms do this is one of the best regarded frameworks for understanding internal corporate venturing and strategic growth more broadly (Penrose, 1995). Briefly, she argued that firms comprise collections of resources, bound together by an administrative function. The assets and resources of a firm could be identical, but the "services" they render in terms of what executives do with them might be quite different. A key function of executives is to serve as the internal entrepreneurs for their firms, constantly seeking opportunities to deploy the resources under their control in new ways. What executives do, therefore, is engage in what we would today call corporate venturing—seeking new business opportunities where existing firm resources could be deployed.

Following Penrose, theorists in the resource-based tradition in strategy argued that rather than being fungible collections of assets, firms were unique. They were shaped by their past experiences. They gained advantage by offering (in her words) "services" that no other firm would be able to duplicate, because the learning process that underlies the service was unique and path dependent. She also presaged the idea of entrepreneurial rent by observing that even resources purchased on open markets become unique within the confines of a particular firm, giving it (for a time) the chance to occupy a monopoly position. Penrose was unabashedly interested in the "insides" of firms and the managers who made decisions on behalf of their organizations.

Firms would grow, according to her theory, to the extent that their services, or unique capabilities, were relevant in new opportunity spaces not currently being served by the firm. Entrepreneurial managers, with deep knowledge of the firm's capabilities, search for new areas in which those capabilities might be useful. They would extend the resources of their firms into these areas. If they were successful, they could establish a new advantage that was not immediately copied by competition because no one else shared the learning underlying the new offering.

The resource-based view of strategy was highly influential to the concept of Discovery-Driven Growth. The idea that a fundamental unit of competition was not a set of assets but the corporate equivalent of a skill found expression in concepts such as an organization's "core competence" or "capabilities" (Collis, 1994; Eisenhardt & Martin, 2000; Prahalad & Hamel, 1990; Stalk, Evans, & Shulman, 1992). Unlike beginning with what an attractive industry looked like, this perspective emphasized identifying what a firm's unique capabilities were and finding places where they might be profitably deployed. This is virtually identical to the "search" for product-market fit described in the Lean Startup, with the difference that the mechanism in the resource-based view is the desire to deploy firm resources to profitable markets, while the motivation for search in the Lean Startup is the observation of a potential opportunity.

The Relationship Between Innovation and Competitive Advantage

In the resource-based or dynamic capabilities view, innovation cannot be separated from strategy because it is the starting point for the creation of new capabilities. A corporation's competitive essence consisted of a series of "stocks and flows" of capabilities that could not be acquired from a strategic factor market (Barney, 1986; Dierickx & Cool, 1989). What that meant, in turn, was that companies needed, over time, to build capabilities that had competitive relevance—they could not just buy them. In other words, innovation, or the creation of something new under conditions of uncertainty, was not just a process that accompanied strategy, it was the heart of competitive advantage.

McGrath found that capability-building proceeds, just as the resource-based theory would suggest, through a path-dependent and iterative process, as described in *The Entrepreneurial Mindset* (McGrath, 1993b; McGrath & MacMillan, 2000). Blank and Eckhardt observe that one of the limitations of the Lean Startup model is that it does not provide a clear connection between the processes it invokes and a potentially enduring competitive advantage. McGrath's empirical research offers a bridge between Lean Startup principles and the capture of rents as a consequence of successful venture formation (McGrath, MacMillan, & Venkataraman, 1995; McGrath, Tsai, Venkataraman, & MacMillan, 1996; McGrath, Venkataraman & MacMillan, 1994).

Figure 1 outlines the relations among the variables associated with the increasing ability of a project to access rents (McGrath et al., 1996).

The data for this study was drawn from surveys completed by team members from 58 innovation projects underway in 40 different firms in 8 countries. An innovation was defined as the development of a new offering, entry into a new market, or a significant attempt to improve or restructure a process (such as the adoption of a new technology in a manufacturing firm or implementation of a major new operating system in a services firm). Each variable was derived from these surveys. The surveys were administered repeatedly over time, and for many projects the dependent variable (whether a new competence was increasing the potential for rents) was gauged not by the project team members but by a separate group of senior team leaders.

Causal Understanding: Incorporating Learning Into Planning

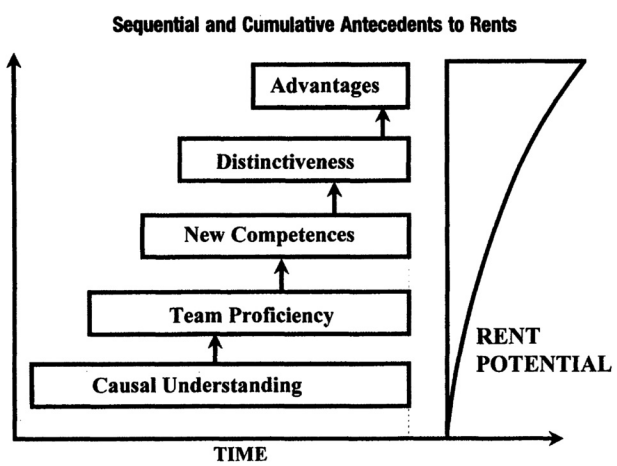
The first, and most significant, building block for a new competitive capability is whether a team is increasingly able to understand the drivers of success for a business. In the initial stages of a new business's development, by definition, causal understanding is low. As a team works on the project, their understanding of key elements of what the business needs to accomplish will increase. The measures for this variable were obtained by asking team members "to what extent does your team understand the following aspects of the project," where the response was scored on a 5-point Likert scale with one pole being "we have no idea at this stage" and the other being "we know exactly." The questions respondents scored were the kinds of questions the Lean Startups propose entrepreneurs ask—considering, for instance, whether the respondent had a good understanding of the customer need being satisfied.

Having the variable "causal understanding" as the first variable in the capability-building process chain is entirely consistent with Blank and Eckhardt's observation that "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." (Blank and Eckhardt, 2023: 9). Starting with this building block is also entirely consistent with Discovery-Driven Growth, as the role of the process is to create learning checkpoints through which greater knowledge of each of these variables will be created.

Moving Toward Organizational Capability and Eventual Advantage

The second attribute measured in McGrath's model is team "deftness." This measures the extent to which a team can work together fluidly. For this metric, responses were arrayed so

Figure 1
Relationship between variables leading to rents from innovation



that a high level of a characteristic was on one side of the choice and a low level on the other. Team members placed their opinions of how their teams were operating between the two statements. Specific variables for team deftness measure whether the right people are in the right roles, how committed those team members are to a common goal, whether information is flowing freely, whether members trust one another, and whether the team is operating in a psychologically safe way. These measures drew on Wernerfelt's observation that proficient teams lead to inimitable deeply embedded routines and, of course, Edmondson's observations about the critical importance of psychological safety in teams (Edmondson, 1999; Wernerfelt, 1989).

As knowledge about the business grows, a team can behave more consistently and confidently. Then, in a manner similar to Blank and Eckhardt's emergent process of customer discovery, customer validation, customer creation, and company building, this model measures the traces of emergent competence. Competence is defined as the project team's increasing (or not) ability to consistently achieve its objectives, similar to how one might measure a skill in a person. Creating new competence is a necessary but not sufficient condition to creating a competitive advantage.

Of the competences being created, some are distinctive. That means that only the firm that has engaged in the learning journey is likely to be able to utilize them. Of particular interest are those that are likely to increase market attractiveness of the team's offerings or to increase the efficiency of what the team is working on (which is particularly relevant to the case of teams working on process improvements or similar projects). At this point, we are connecting the entrepreneurial journey of a particular team to the new capabilities that, in the resource-based view, lead to competitive advantages that can endure.

Finally, we come to the question of how we might know that an innovating firm has the potential to create a competitive advantage. This has been a thorny issue for researchers in the resource-based tradition, because it almost willfully ignores the idea of competitive advantage as defined by the positioning school in terms of variables such as market share. The RBV instead posits unique connections between firms and customers that by definition are potentially accessing different resource pools. Indeed, this is one of the major criticisms of the RBV, as one can very quickly end up with a circular argument, leading to charges that it is tautological (Priem & Butler, 2001).

This necessitated coming up with a concept that represented the potential for rent-generating capabilities. There are three essential factors, McGrath's research suggests. The first is marketplace enthusiasm for the offering, a variable that was called "market worth." This represented the belief on the part of target customers that the offering would either provide greater value to them or save them costs. The second is the extent to which the parent corporation would be supportive (and remain supportive) about the venture. This, by the way, is not a given—one of the realities of the corporate venturing process is that it is entirely possible for an offering that is embraced by the market to be rejected by its parent company (Burgelman & Valikangas, 2005). Finally, we have the question of competitive insulation. This variable seeks to understand whether there are barriers to entry, patents, or other ways in which the outputs of the venture can be protected from easy competitive imitation or matching. Of these three variables, Lean Startup tests only for market acceptance and not explicitly for the other two.

One of the more interesting aspects of the model is that the development of each variable proceeded in a path-dependent and sequential way. Causal understanding had the most direct

effect on teamwork, but high levels of causal understanding unaccompanied by increased levels of team deftness did not result in higher levels of competence. Similarly, higher levels of competence without distinctiveness did not result in a greater likelihood of establishing competitive advantage (McGrath, 2001; McGrath, Venkataraman & MacMillan, 1994; McGrath et al., 1995, 1996).

Exploration, Exploitation, and Learning

McGrath also measured, following March's seminal idea of exploration and exploitation in organizational learning, the extent to which the level of uncertainty in a project changed over time (March, 1991). One of the more interesting discoveries was that the relationship between organizational structure thought to foster innovation was not as straightforward as preexisting theory would suggest. As far back as the work of Burns and Stalker, it has long been believed that "organic," loosely coupled structures were more suited to innovation tasks while "mechanistic," more programmatic structures were suitable for executing against routine and known activities (Burns & Stalker, 1966).

Her work found—not so fast! Organic organizational structures were only positively related to increases in competence when group deftness was high, when causal understanding was rich, and when the level of newness (or exploration) of the project was low. This is the key insight behind the discovery-driven approach. One can only build a rent-creating valuable new capability when teams are operating effectively, when enough learning has taken place to know what drives what in the business, and when one has built a basis of knowledge to move forward. In other words, to create valuable new capabilities one has to reduce the level of exploration in a project, meaning one needs to convert assumptions into knowledge in order to make progress. Only then does a loosely knit, self-managing structure add value.

Comparing Lean Startup and Discovery-Driven Growth

We can now consider the ways in which the Lean Startup approach and the discovery-driven one align, and where they may diverge Table 1.

The Perilous Practice of Innovation: Further Research Welcome!

Both Discovery-Driven Growth and Lean Startup emphasize the importance of learning by taking exploratory actions that cause project team members to interact with their environments rather than emphasize extensive planning under high levels of uncertainty. Discovery-Driven Growth, or more specifically, the empirical research that preceded its publication, draws a connection between the learning and organization-building activities of teams and the potential for rent-generating competitive advantage by firms. While Blank and Eckardt's paper is focused on the contributions and potential of Lean Startup to the entrepreneurship literature, here the focus has been on large organizations and how entrepreneurial behavior is theoretically and empirically connected to strategic advantage. Both have enormous potential value to future entrepreneurs and corporate leaders. Nonetheless, we are still grappling with issues having to do with learning, innovation, and venturing that remain unresolved. These offer fruitful areas for future work.

Table 1
A Comparison of Lean Startup and Discovery-Driven Growth Approaches

Theoretical Elements	Approach Taken
Starting point	Lean Startup begins with the perception of an opportunity based on an entrepreneurial idea, without clearly specifying what would allow an idea to cross an acceptability threshold. DDG begins with the perception of an opportunity, and then tests whether it is likely to be able to deliver to a specified level of success.
Emphasis on scientific method and hypothesis testing	Both DDG and the Lean Startup emphasize the importance of creating testable hypotheses, conducting tests, and proceeding in an iterative manner. Lean Startup has a prescribed four-step process while DDG offers a range of points of possible learning paths.
Learning design	Lean Startup explicitly includes a build-measure-learn loop in which startups build a minimum viable product (MVP), measure its performance, and learn from the data to inform the next step. DDG instead uses experimentation and testing at checkpoints, which might involve building something or which might not. DDG is also explicit about which variables require testing that don't relate to customers.
Underlying financial logic	DDG explicitly builds on the idea of option value—making small investments to access a potentially valuable upside without the commitment to invest to complete an entire project. Lean Startup implicitly assumes profit-motivated entrepreneurs building models as they move through the process, but the underlying mechanism is not specified.
Treatment of heuristics and biases	Both methods explicitly attempt to counteract heuristics and biases in decision-making; Lean Startup through iteration and pivots; DDG through checkpoints and checkpoint review meetings.
Market emphasis	Lean Startup places central emphasis on the emerging interactions between customers and the firm. DDG covers a broader range of potential concerns, including support by the parent firm, ecosystem considerations, and competitive interactions. DDG suggests that entrepreneurs also need to think about financial markets and markets for human capital as they plan their businesses. A concern with Lean Startup is that it focuses on early adopters, risking a business being unable to appeal to more mainstream markets.
Definition of competitive advantage	Lean Startup assumes that once a venture has discovered product-market fit that this will lead to a competitive advantage. It does not address the problem of excessive entry or of protection from competitive imitation. DDG looks explicitly at whether an offering can create competitive insulation in addition to firm and market acceptance.
Treatment of financial viability	Lean Startup relies on the business model canvas to understand the profit implications of a potential business but does not incorporate a mechanism to ensure consistency among the elements. The reverse income statement incorporated in DDG enables users to continuously test the financials in a potential business for consistency and realism.
Applicability	The Lean Startup approach lends itself well to software and technology-based products where creating MVPs and testing them is low cost and can be done quickly. DDG has been used for a broader variety of ventures, including not for profit and technology-first efforts.
Strategic Focus	The Lean Startup emphasizes rapid experimentation and quick pivots. A risk is that an entrepreneur may well settle on the first acceptable solution rather than pushing for one that could be even better. DDG emphasizes strategic

(continued)

Table 1 (continued)

Theoretical Elements	Approach Taken
	fit up front by specifying what success must look like, then having teams avoid making decisions that do not show the promise of delivering to this outcome, established in advance.
Approach to risk	Both methodologies reduce the risks associated with new ventures by testing assumptions early and frequently, limiting the expense of building actual products or organizations until assumptions about viability are validated.

Centuries ago, Machiavelli made the following trenchant observation:

> There is nothing more difficult to take in hand, more perilous to conduct, or more uncertain in its success, than to take the lead in the introduction of a new order of things. For the reformer has enemies in all those who profit by the old order, and only lukewarm defenders in all those who would profit by the new order, this lukewarmness arising partly from fear of their adversaries . . . and partly from the incredulity of mankind, who do not truly believe in anything new until they have had actual experience of it. (Machiavelli, 1532, reprinted 1981)

Machiavelli's observation remains a reality for the corporate innovation function and reflects its central tensions. As Baumol pointed out, we are simultaneously in an innovation arms race, which forces firms to innovate while at the same time decision-makers in most large organizations are beholden to the rhythms and processes of their existing businesses. A reality of the innovation function is that relative to the rest of an established organization, it is often tiny, lacks power, and is easy to ignore in the near term. Innovation happens, but it is often unplanned, haphazard, and poorly connected to a firm's strategy (Burgelman & Valikangas, 2005). An enduringly interesting question then is why this is. There is widespread agreement that techniques such as Lean Startup and Discovery-Driven Growth offer a roadmap for innovating quickly with relatively low risk. We also know that the investing community rewards companies that have a good growth story and tell it well (McGrath, van Putten, & Pierantozzi, 2018). Understanding why firms struggle so much to build a consistent mechanism for innovation and how to create a balance between the organization of today and the potential organization of tomorrow remains a rich area for exploration.

The nature of the relationship between enjoying success and nurturing the ambition to search for new opportunities is also complicated. Firms that have enjoyed tremendous success often seem to lose their appetite for growth and innovation. Microsoft, for instance, required a massive transformation to wean itself from the rich profits it earned through its dominance in software for personal computers. Nokia, similarly, ended up exiting its highly successful handset business entirely and indeed pulled out of the consumer-facing business. Earlier on, Xerox struggled once it was forced to give up its patents on a near-monopoly in plain paper copying (despite having virtually created the office of the future in the form of the Palo Alto Research Center). In each case, the structure of incentives went from active search for growth to defending an advantage that had been established in the past. We know relatively little about how ambition fades in a highly successful organization and what it would take to rekindle it.

In the literature on learning, innovation, and change, a classic distinction is that of exploration versus exploitation. March characterized this as the difference between the "exploration of new possibilities and the exploitation of old certainties" (March, 1991). As he points out, there are characteristics in organizations that tend to favor exploitation over exploration—namely that the returns to exploitation are proximate, certain, and easily understood. In an environment in which teams can learn rapidly at low cost and risk, however, such a distinction may well be becoming blurred. If a team is learning quickly in short bursts and continuously upgrading the capability it operates with, exploration and exploitation happen contemporaneously. This calls into question the conventional distinction and suggests that adoption of techniques such as Lean Startup and Discovery-Driven Growth might change the traditional tradeoffs of investing time in the here and now and building for the future.

Both Lean Startup and Discovery-Driven Growth imply that many conventional metrics used in business offer very little that is useful for early-stage innovations. Typical measures such as return on investment are lagging indicators and of very little help with respect to guiding innovation efforts in a fruitful direction. Further, the structure of corporate reporting practices, particularly for public companies, often fails to properly account for some of the most important assets a firm may have, such as its ability to consistently introduce innovations. Timing mismatches are particularly difficult to deal with—business reporting often takes place in quarters and years, while innovations are a multiyear process that requires sustained effort. Most corporate budgeting processes are completely unfit for purpose and work to create better systems is still at an early stage (Bogsnes, 2016).

It is also true that modern digital workplaces have evolved in such a way that innovation is potentially far more democratic than was possible in an analog world. Practices that were once cutting edge have become commonplace. To name just a few, consider digital transformation, transformations in general, flat organizations, the rising emphasis on corporate purpose, the importance of ecosystems, increasing respect for learning through failure, the *RenDanHeYi* Model made famous by Chinese appliance giant Haier, the rise of crowdsourcing, and even decentralized autonomous organizations (or DAOs). Such practices further blur the lines between the operating parts of an organization and the innovating parts, making the questions of metrics and performance measurement quite complex.

In an innovation arms race, those who unilaterally disarm will be at a major disadvantage, given enough time for competitive dynamics to play out. In effect, argues economist William Lazonick, that is what policy incentives that allow resources for innovation to be siphoned off to reward shareholders and executives accomplishes. He has for many years pointed out that innovation requires a retain-and-reinvest mindset (in other words, retain profits within the firm and reinvest those profits in discovering the next-generation innovations). Nonetheless, corporate decision makers are often richly rewarded, both personally and professionally in engaging in what he calls "predatory value extraction."

Executed primarily through stock price manipulation in the form of open market share buybacks, this behavior essentially extracts value created from previous successful innovations and rewards only one of the key stakeholders of a corporation—its shareholders. Citing examples such as Boeing (whose faulty software killed people), Intel (whose failure to invest in chips for mobile devices led it to cede its primacy to Asian manufacturers and plead for a government bailout), and Cisco (which is in the process of missing out on critical next-generation technologies), he concludes that the current policy framework does too little to incent companies to innovate (Lazonick, 2023).

The results have not been pretty—low wages for massive numbers of people, extreme inequality, hundreds of thousands of layoffs, and the risk of losing out to international competitors whose executives are not rewarded for making such decisions. Edith Penrose would similarly have warned of the dangers of destroying the growth processes led by entrepreneurial managers when their primary interest became individual self-enrichment (Penrose, 1995). While neither Discovery-Driven Growth nor Lean Startup are going to solve the problem of the potential misallocation of resources in the current capitalist system, they are part of a robust theory of what it does require if we are going to have innovating firms and an innovating, entrepreneurial economy (Henderson, 2021). Making the case that we would all be better off if we stopped rewarding predatory behavior and better favored innovative behavior would be a worthy project, indeed.

Rich Kaarlgard, a columnist with *Forbes,* has declared that an appropriate motto for the age of AI is "who learns fastest, wins." He points to the astonishing progress that truly creative entrepreneurial endeavors make, even when compared with well-resourced and entrenched incumbents. As he says, the real story of economic progress is not about supply and demand or capital and resources. "The real story is about human creativity, curiosity, surprise, experimentation. It is chiefly about learning curves. Who learns fastest, wins" (Kaarlgard, 2023). With Discovery-Driven Growth and Lean Startup principles at the ready, rapid learning at low risk can be marshalled by those organizations willing to adopt these techniques. Those who fail to do so are likely to be left far behind.

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Lean Hypotheses and Effectual Commitments: An Integrative Framework Delineating the Methods of Science and Entrepreneurship

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Recently, there is increasing interest in building theories that offer actionable guidance to the practice of entrepreneurship. Here I present a general theoretical framework, called CAVE, for understanding, assessing, and enhancing existing tools that offer such guidance. The framework encompasses a two-dimensional space with prediction and control as its axes. The CAVE framework accommodates a wide variety of extant practical tools as well as relevant concepts from psychology and economics. Specifically, I compare and contrast effectuation with lean startup within this framework. Whereas lean startup centers around hypothesis testing, effectuation focuses on cocreative commitments from self-selecting stakeholders. In other words, the former takes markets as exogenous, while the latter explicates how they can be made endogenous and why that matters. More generally, I show how these differences connect with and delineate the scientific method from the entrepreneurial method.

Keywords: *lean startup; effectuation; scientific method; entrepreneurial method; non-predictive control; hypothesis testing; market shaping; experimentation; cocreation*

Introduction

Reality is always more textured and complicated than any theory, whether descriptive or normative. Yet, it is precisely because of this multifaceted messiness of reality that we need theories, especially theories that offer actionable guidance in the form of frameworks and

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heuristic principles. Effectuation (Sarasvathy, 2001), originating in a rigorous study of a representative sample of expert entrepreneurs (Read, Dew, Sarasvathy, Song, & Wiltbank, 2009; Sarasvathy, 2022 [2008]), then elaborated through dozens of studies in a variety of settings using a variety of empirical methods, offers such guidance. Lean startup (Ries, 2011), inspired by Blank's (2005) work on customer development originating in practical observations in one convenient, yet important, corner of venturing activity—namely Silicon Valley startups—and spread through best sellers and consulting activities, also offers useful guidance for navigating messy reality. In this essay, I seek to carefully spell out differences with a view to integrating these into a more generalizable theoretical framework that can fruitfully inform future research and entrepreneurship education. In doing so, I heed Geertz's (1973) wisdom about thick description, "What generality it contrives to achieve grows out of the delicacy of its distinctions, not the sweep of its abstractions." (320)

The general framework, called CAVE, is a modification of the Prediction Control (PC) Space theorized in Wiltbank, Dew, Read, and Sarasvathy (2006). The CAVE framework consists of the four quadrants – Causal, Adaptive, Visionary and Effectual. Not only is this a framework that can map several different theories of strategic management, but it also accommodates a wide variety of practical toolboxes currently in use in entrepreneurship education and training around the world. These toolboxes are related in interesting ways to key concepts from disciplines ranging from psychology and economics to history and philosophy. Most importantly, they offer spaces for delineating the scientific method and the entrepreneurial method without turning the two into a straw man dichotomy. Instead, the CAVE framework allows us to build a useful and meaningful tapestry worth examining at different layers of complexity.

In the ensuing essay, I first present and explicate the CAVE framework, showing how extant techniques and toolboxes from practice, including lean startup and effectuation, can be arranged within it. This mapping exercise organically leads to the delineation of science and entrepreneurship as adjacent yet interconnected methods within the PC space. The mapping also embraces the fact that the scientific method underlies both research and practice in entrepreneurship, just as entrepreneurial approaches have always been part of the development of science and technology through human history. After the section discussing this delineation and interconnection, I briefly outline the need for and usefulness of effectuation as a toolbox to navigate the non-predictive control quadrant within the PC space. I then connect back to lean startup describing overlaps and distinctions between effectuation and lean startup as actionable theories. Finally, I end with a brief yet crucial discussion of the dubious role of performance in the development of content for entrepreneurship education.

Brief Review of Effectuation

There is no need to belabor the details of effectuation that have been dealt with in great depth in dozens of peer reviewed articles and several books (see Alsos, Clausen, Mauer, Read, and Sarasvathy, 2019 for a recent special issue). However, for the sake of clarity and convenience. I would like to outline its basic skeletal structure here:

- As mentioned earlier, the five principles of effectuation were derived from a cognitive science-based study of expert entrepreneurs who participated in a think aloud protocol experiment involving 10 typical decisions that occur in all startups.

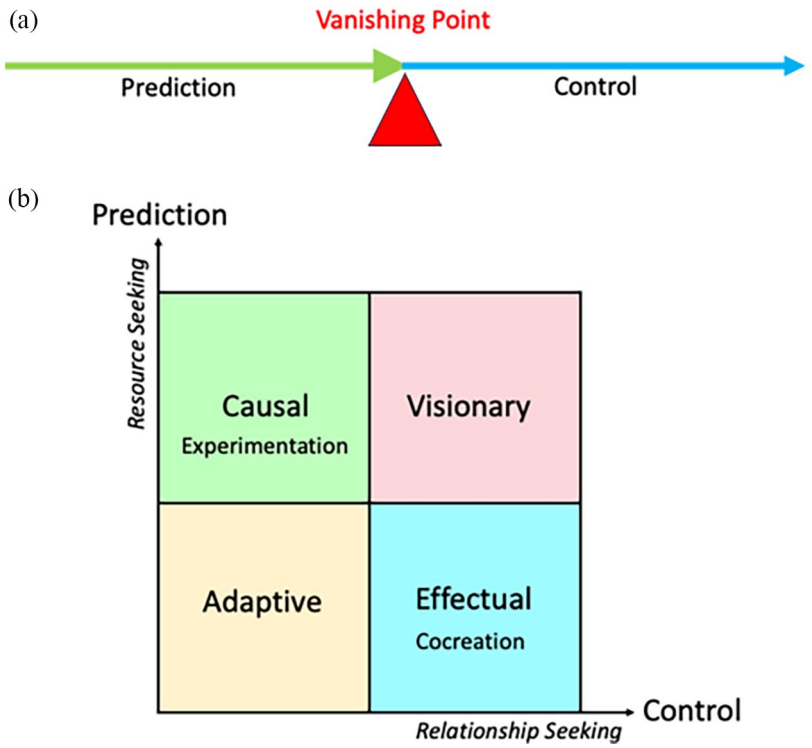
- Each of the five principles minimize or eliminate prediction:
  1. Bird-in-hand: Work with things already within your control, specifically who you are, what you know, and whom you know, to come up with ventures you can immediately start building. No need to wait for a brilliant new-to-the-world scalable idea. When it comes to ideas, doability trumps scalability. Note that the former is within one's control, the latter is not.
  2. Affordable loss: Invest no more than you can afford to lose, preferably as close to zero as possible. No need to worry about expected return. The important thing is to keep the downside within your control, as well as choose a project worth doing irrespective of its likelihood of success.
  3. Crazy quilt: Work with whoever wants to work with you and is willing to invest real skin in the game. In other words, allow stakeholders to self-select by making actual commitments. No need to worry about potential competitors when next steps are underwritten and made affordable loss by committed stakeholders.
  4. Lemonade: Leverage contingencies and transform even negative ones, including failures, into new opportunities. No need to avoid surprises. They are ingredients feeding into bird-in-hand and affordable loss. They also offer ways to strengthen the bond with self-selected stakeholders.
  5. Pilot in the plane: Since history does not run on auto-pilot, see and treat all committed stakeholders as partners and copilots. No need to predict and place bets on the future when you can shape and cocreate new futures with people you did not even know could be your stakeholders, but who walked in with real commitments.
- Effectuators work with things already within their control to cocreate new and as yet unpredictable futures and goals, whether embodied in products, ventures, institutions, or markets. In other words, in effectuation control is not merely an outcome. Control is strategy. Moreover, when control is strategy, prediction is unnecessary and irrelevant.
- In terms of performance implications, effectuation increases the probability of innovation when success occurs and decreases the costs of failure when failure happens. Thus it does not directly impact the probability of success or failure of any given venture. However, whenever entrepreneurs are willing to start more than one venture, an effectual approach does increase the probability of success of entrepreneurs, irrespective of the probability of success of any given venture they might start.

The Prediction Control Space

It is important to note two facts about effectuation. First, effectuation is a theory derived from a study of expert entrepreneurs (Read, Dew, Sarasvathy, Song, & Wiltbank, 2009; Sarasvathy, 2022 [2008]). Hence, it does not claim that all entrepreneurs are effectual; nor even that successful entrepreneurs are effectual; or worse still, that effectual action will lead to venture success. Second, the means-driven action named bird-in-hand principle is but one of five principles in effectuation, each of which is characterized by the reduction of prediction and embrace of control as strategy. In other words, an action is effectual to the extent that it reduces reliance on predictive information, and not primarily on whether it is means- or goal-driven.

Hence the most important insight from the original think-aloud protocol study of expert entrepreneurs is that prediction and control can be conceptualized as orthogonal to each other. As depicted in Figure 1a, received wisdom prior to the discovery of effectuation, whether from the sciences or economics, posited that there is nothing but a vanishing point between prediction and control. This wisdom can be traced back to the origins of the

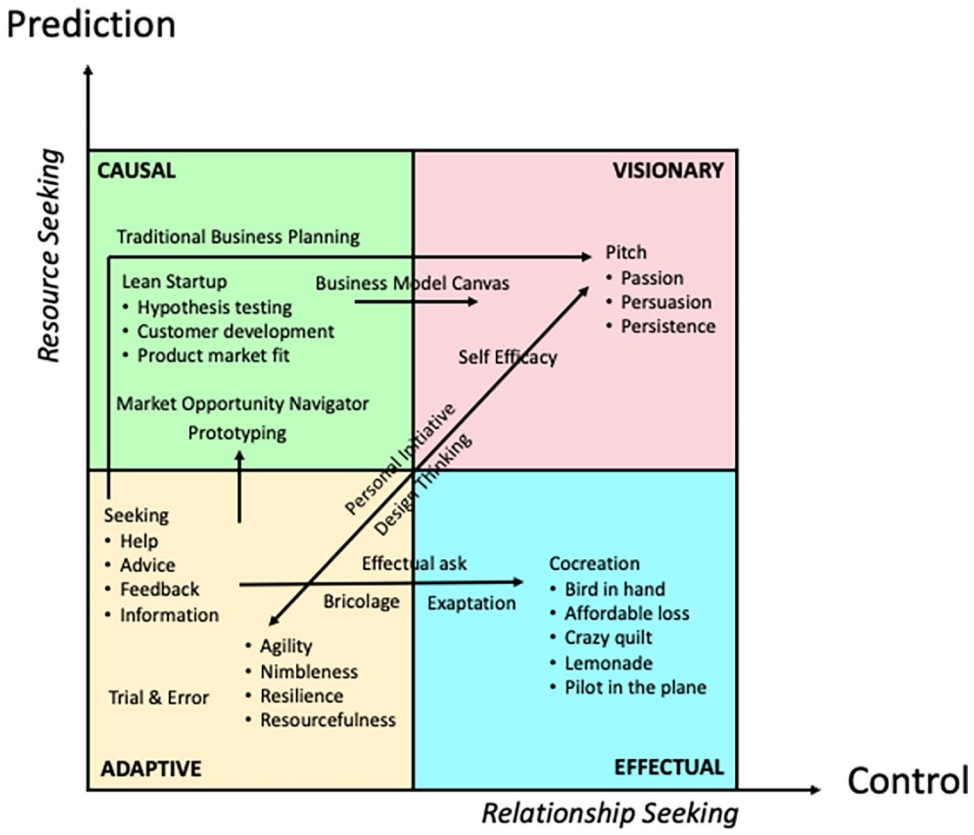
Figure 1
(a) What the Scientific Method Teaches and (b) What Entrepreneurs Learn: The Dimensionless Point Is a Space onsisting of the Four Quadrants of the CAVE Framework



scientific method (Merchant, 2015; Pearson, [1911] 1957; Salmon, 1999). Since prediction and control are tightly coupled in science, the more we can predict the relationship between two variables, the better we can control one in terms of the other. In contrast, the lessons expert entrepreneurs learn through years of lived experiences starting and running both successful and failed ventures lead them to see that the dimensionless point between prediction and control can be expanded into a two-dimensional space, as depicted in Figure 1b. Here, control is not only an outcome of prediction, but is also a strategy in itself, without having to be derived from prediction.

Wiltbank et al. (2006) explicated this insight through a detailed review of strategic management literature to show how various theories could be mapped on to the PC space. In deference to extant strategic management theories at the time, the causal quadrant was labeled "planning" strategies and the effectual was labeled "transformative" strategies. Since then, the PC space has been used to map theories from other areas, such as internationalization (Galkina & Chetty, 2015), uncertainty (Packard, Clark, & Klein, 2017), networking (Engel, Kaandorp, & Elfring, 2017), entrepreneurial psychology (Sarasvathy, 2021b), design (Berglund, Bousfiha, & Mansoori, 2020), and negotiation (Sarasvathy & Botha, 2022).

Figure 2
Techniques and Toolboxes in the CAVE Framework



In addition to theories from the social sciences, we can also map techniques and toolboxes from entrepreneurial and management practice onto the PC space, as I have done in Figure 2. Note that the collection of techniques is not meant to be complete. Nor is the location of each one a proof of its connection to others in its vicinity, since several of these have been developed independent of each other. Occasionally, some techniques have been grouped together in literature and hence I put these together, through bullet points, into a toolbox. Even in the case of toolboxes, however, each of the bullet points (techniques) can still be seen and studied as separate from each other.

For ease of comprehension, I have divided the discussion below into two parts along the diagonals. We will begin with the adaptive quadrant.

The Adaptive-Visionary Diagonal

The adaptive toolbox on the bottom left encompasses a wide variety of techniques related to the literature on help-seeking. In their review of this literature, Lim, Tai, Bamberger, and

Morrison (2020) identified four kinds of nonfinancial resources—advice, feedback, help, and information—all of which are part of entrepreneurship, whether within organizations or in the development of de novo ventures. This quadrant encompasses both early-stage resource-seeking in normal situations of venturing, as well as techniques that rely neither on prediction nor on control. Several of these may be conceptualized as psychological variables, such as agility (Stephan et al., 2023), nimbleness (Ancona, Backman, & Isaacs, 2019), resilience (Ayala & Manzano, 2014), and resourcefulness (Williams, Zhao, Sonenshein, Ucbasaran, & George, 2021) in responding to the unexpected. Therefore, this quadrant is primarily reactive to the environment, seeking to adapt both in the beginning and along the way when surprises hit.

In addition to working as mundane starting points to entrepreneurial action involving trial and error—and as useful reaction to the unexpected—techniques in this quadrant can be incorporated into creative approaches such as bricolage (Baker & Nelson, 2005) and design thinking (Sarooghi, Sunny, Hornsby, & Fernhaber, 2019), as well as evolutionary approaches such as exaptation (Andriani & Cattani, 2016). At the opposite end of the diagonal from the adaptive lie the tools and techniques of a visionary approach (Baum, Locke, & Kirkpatrick, 1998). While sometimes these are conceived as starting points for the entrepreneurial process, they can also be seen as endpoints ensuing from a step-by-step information-gathering movement from the adaptive, through the causal, into the visionary quadrant.

Additionally, psychological training in the development of personal initiative (Frese, Hass, & Friedrich, 2016) and the strengthening of self-efficacy (Gielnik, Bledow, & Stark, 2020) may move back and forth along the diagonal in tandem with creative approaches like design thinking and problem-based learning, rather than step by step across the three quadrants. As we will see in the next section, these types of training may help traverse and even span the boundary between science and entrepreneurship in productive ways.

Keeping the above movements in mind, let us consider the toolboxes and techniques located within the visionary quadrant. The most important technique here consists in a pitch (Ciuchta, Letwin, Stevenson, McMahon, & Huvaj, 2018). The visionary pitch contains within it a powerful compelling idea, preferably an innovative one that is shored up with passion, confidence, and persuasion in communicating it to targeted stakeholders that own the necessary resources to implement the vision (Clark, 2008; Clarke, Cornelissen, & Healey, 2019). The most studied and widely taught pitch in entrepreneurship education is the investor pitch (Balachandra, Briggs, Eddleston, & Brush, 2019; Chen, Yao, & Kotha, 2009). Equally important in practice, but not taught as much, is the sales pitch (Cespedes & Weinfurter, 2016; Matthews, Chalmers, & Fraser, 2018; Spiller, Kim, & Aitken, 2020).

The question then arises: How does a visionary construct his or her pitch? Sometimes, as in largely apocryphal legends about entrepreneurs such as Steve Jobs and Elon Musk, the answer lies in sheer force of personality, consisting in psychological traits such as self-efficacy, passion, persistence, and so forth (Cardon & Kirk, 2015). A compelling pitch can also be explained in terms of the power of the idea or the vision itself: "to be Earth's most customer-centric company" in the case of Amazon, or "a microcomputer on every desk and in every home running Microsoft software." It can also consist in sheer chutzpah as in the case of "Just do it" from Nike, or the daring of a reckless risk taker—Reid Hoffman's "jumping off a cliff and assembling the plane on your way down" being an iconic example of the latter.

For most teaching and training purposes, or even for actually building these very same ventures listed above, constructing and delivering a winning pitch takes more than mere

bromides. This is where the causal quadrant can contribute substantive content for a winning pitch. A convincing pitch or even a compelling story requires good information, data connecting elements of the business model, such as product features and customer needs, combined into strong value propositions. That, in turn, requires research, whether traditional market research or discovery processes such as those elaborated in lean startup and the business model canvas (Keane, Cormican, & Sheahan, 2018; Osterwalder & Pigneur, 2010).

The Causal-Effectual Diagonal

Before the publications on effectuation (Sarasvathy, 2001), customer development (Blank & Dorf, 2012), and lean startup (Ries, 2011), the dominant deliverable in entrepreneurship courses and training programs consisted of business plans. One could argue that that continues to be the dominant paradigm, even today. The continuing prevalence of business plan competitions provides evidence for that. The importance of business planning is also attested to in academic articles exhorting as well as critiquing the need for and importance of business plans. Delmar and Shane (2003), for example, found that business plans reduced the probability of disbanding and increased the speed of product development and organizing activities. Honig and Karlsson (2004) found that even without a strong relationship between plans and performance, entrepreneurs were coerced through institutional or mimetic pressures into investing time and effort in writing lengthy business plans.

In a meta-analysis of the business plan literature, Brinckmann, Dew, Read, Mayer-Haug, and Grichnik (2019) examined the antecedents to business planning. They found that while education and general work experience had a positive relationship to planning, entrepreneurial experience had a negative effect. This coheres well with Blank's (2019) arguments for moving beyond the target market roulette. The entrepreneurial experiences recounted by Eric Ries that led to his abandoning traditional business planning in favor of the lean startup model also offers a case in support of this finding. The overwhelmingly negative reactions to market research and business plans found in the study of expert entrepreneurs also support the finding that individuals with entrepreneurial experience were significantly less likely to invest in business planning.

However, the lessons drawn by Ries from his experience, incorporated in the lean startup model, are different in important ways from the lessons drawn by expert entrepreneurs in the study leading to effectuation. Specifically, Ries inferred from his experiences that breaking down the business plan into its components, formulating hypotheses about customer behavior, and testing them through careful experiments, was the needed antidote. The expert entrepreneurs I studied went a step further from this to conclude that in addition to validated predictions based on experimentation, one can also simply minimize or even completely eliminate prediction altogether (in a later section below, I outline how effectuation does this). Note that the core insight remains the same: business plans do not work. However, the remedies for that problem can vary from deeper understanding of customer development and more careful experimentation, to effectual cocreation with a wider variety of stakeholders than customers alone.

In order to illustrate how and why expert entrepreneurs may navigate the PC space to arrive at an effectual approach in the quadrant of non-predictive control, it might be useful here to consider the experiences of one such entrepreneur, in his own words.

Viaweb: An illustrative case along the causal-effectual diagonal. The following is an excerpt from Livingston's (2008) interview of Paul Graham, cofounder of Viaweb, who later went on to found the iconic accelerator YCombinator that has trained hundreds of founders of startups with a proven record of above average success rates. The interview provides rich details of an entrepreneur's experiences that can help make our explication of the CAVE framework come alive (2008: 205):

> Livingston: You had a different startup before Viaweb, didn't you? Can you tell me a little about that?
>
> Graham: Before Viaweb we had a startup called Artix. We were going to put art galleries online. The problem was, art galleries didn't want to be online. They still don't want to be online. We spent a long time trying to convince these people to use something they didn't want before we had the idea that maybe we should make something people actually did want.

This description of Artix fits with a visionary view of the PC Space, a vision that was rudely dispelled by the reality of no one willing to buy the vision. This rude awakening is similar to Ries' early experiences building IMVU that he recounts in his book as the inspiration for the lean startup model. Based on the CAVE framework, we could imagine Graham (or Ries) simply quitting (adaptive) or persisting without pivoting (visionary in response to the market's rejection of their vision). We could also posit Graham learning the lessons Ries learned; namely, that he needed to carry out more careful experimentation. In the entrepreneur's own words, let us see what happened next (2008: 205-6):

> Livingston: You scrapped Artix and switched to making software for websites for online stores?
>
> Graham: Yeah. Actually, it's pretty similar software. We realized that if we could write software that could generate sites for galleries, we were only a shopping cart away from generating online stores. Everyone seemed to want online stores, so why not just do that instead?
>
> At least, we thought everyone wanted online stores. There was a lot of talk in the press about e-commerce then, because Netscape was doing a big PR campaign for their IPO. They had to convince everyone that the Internet would be economically important, and they picked the most literal example they could think of.
>
> Actually most merchants didn't want to sell online, not yet. But when they started to want to, we were there.

We can easily pick up a faint flavor of effectuation as well as lean startup in Graham's realization that "similar" software (bird-in-hand) could be used for another market (pivot). Furthermore, there was predictive (causal) evidence for this new market from the media at the time. However, this evidence was not validated in accordance with the lean startup approach using careful experimentation and A/B testing. Even if Graham had considered carefully formulating his hypothesis based on the media predictions, the evidence still rejected it, "Actually most merchants didn't want to sell online, not yet." In other words, Graham did not pivot to a new market that wanted his product, but modified his product by exapting something that was already part of his bird-in-hand.

Yet, eventually, the market came around to wanting what Viaweb had to offer. Was this merely a matter of luck? Or visionary persistence? It definitely does not sound like lean startup or effectuation. To figure this out, we need to dive deeper into what happened between the early customers not wanting it and then the market coming around to it. In the interview,

Graham lists the following steps and turning points in the interim—there is no substitute for reading the original interview in full, but for our purposes here, a bulleted list can suffice:

- Wrote a prototype version of the software in 2 days
- Conceptual leap to make it software on the web rather than on the desktop
- Early funding of $10,000 from a friend, Julian
- Cofounder Morris loses faith in the pace of coding and is reluctant to work alone
- Convinced Morris's classmate Trevor to come on board
- Hired programmers to build and refine a working demo
- Working demo shown to formal investors
- But walked away from the deal since they asked for too much equity

What about customers? (2008: 208)

Livingston: Once you had this demo, did you start thinking about signing up customers or were you focused on raising money?

Graham: What we really thought we needed to do was write more software. We were software guys. Maybe someone who knew more about business would be thinking about going and getting customers, but frankly the idea of customers frightened us. We thought, "Before we go get any customers, why don't we just write a few more thousand lines of code?"

Graham then goes on to list a litany of errors in finding customers, but continuing to write and improve the software because that was what they knew how to do. Along the way angel investors who knew them continued to provide just enough funding to continue. Also, offers for acquisition came along that did not work out. Graham talks about giving away software and not even having the ability to process credit card transactions 2 years into the business. Yet, the business was humming along both on the supply and demand side. In Graham's own words (2008: 212),

> There were always two stories going on simultaneously with Viaweb. There was the software and the customer story, which just went smoothly and wonderfully the whole way along. We kept writing great software, we kept getting more and more customers, the customers loved us, the growth was this beautiful, smooth upward curve. Simultaneously, there was this story about the business, which was one disaster after another. So most of the actual turning points are not software or customer turning points, because everything went great there. All the turning points are business turning points.

These business turning points were almost all related to the soap opera of stakeholder interactions inside and outside the venture. For example, "The next one was probably when Robert went off that summer and took a summer job working for another company." This kickstarted the search for a CEO that brought its own twists and turns until (2008: 213),

> We lucked out. At practically the last moment, we found Fred Egan—or rather, he found us. Fred Egan saved us. That was a great turning point, when we got Fred. The lowest point, well, maybe tied for the lowest point in the company's history, was that summer when Robert was away and the investors were pressuring us to take some business guy as our boss. When we finally got Fred, that ended that summer of horror.

Although expressed in terms of luck, this is not an uncommon turning point in the early histories of enduring companies. By "this" I mean the entrance of a self-selected stakeholder that constitutes the crazy quilt principle in effectuation. The effectuation community has chronicled dozens of these in stories of ventures and entrepreneurs from around the world (Read, Sarasvathy, Dew, & Wiltbank, 2016). Famous examples include Howard Schulz walking into the Pike Place market store of Starbucks and Max Levchin meeting Peter Thiel at a talk at Stanford attended by only six people, leading to several conversations and meetings during one of which Thiel offered to become CEO of Paypal and Levchin agreed.

At the heart of the effectual quadrant is this focus on stakeholder interactions that are less about validating hypotheses or obtaining information and financial resources, and more about gathering commitments from self-selected stakeholders (Sarasvathy & Dew, 2005). This crazy quilt process enables the pilot-in-the-plane principle consisting in the iterative, reflexive, continual shaping, and cocreating of key elements of the venture, including its business model and even the structures, contents, and contexts of its market(s). Note that the term stakeholder in the effectual process goes beyond actual or potential customers and investors to others, especially suppliers and employees (as in the case of Viaweb).

In sum, lessons from entrepreneurial experience span the entire spectrum along all four quadrants of the PC space. Moreover, even as these lessons speak to the futility of pure prediction and planning, most of them go beyond experimentation to the cocreative dance of stakeholder interactions. In other words, they not only highlight the flaws in trying to predict the future, but also shine light on how human beings shape and fabricate new futures.

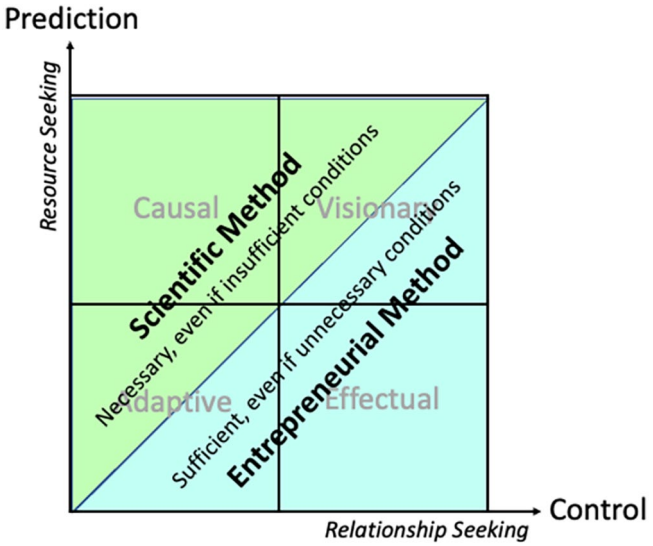
Separating out predictive from non-predictive control offers a powerful framework precisely because it makes room for human action as an agentic, cocreative force that works in tandem with, and is constrained by—yet often independently of and undetermined by—natural forces. This separation brings to view ways in which the space human beings act within is itself endogenous to human action. It is this endogeneity that differentiates the entrepreneurial from the scientific method. Let us investigate that next.

On Science and Entrepreneurship

Figure 3 delineates the PC space into science and entrepreneurship along the adaptive-visionary diagonal. This puts causal squarely within the scientific method and effectual within entrepreneurial. That is because predictive control is the cornerstone of science, leaving non-predictive control as pasture for entrepreneurship. However, it is not necessary to make the delineation overly sharp or mutually exclusive because, as a practical matter, science too is a human enterprise.

All the same, the philosophical and logical concretization of the scientific *method* (Bacon, 1878; Gower, 1997) is still a useful frame to clarify, teach, and practice science in highly productive and beneficial ways. Similarly, specifying a concrete theoretical boundary dichotomizing the scientific and entrepreneurial methods has its uses. The point of such logical and philosophical distinctions is to theoretically clarify, precisely so that they can in reality be mixed and matched in productive and beneficial ways. Keeping in mind both the theoretical

Figure 3
Scientific Method and Entrepreneurial Method



dichotomy and practical combinatorics, we can take a deeper dive into each—separately first, recombining afterward.

Differentiating the Entrepreneurial Method From the Scientific

There are several dimensions along which we can examine both contrasts and complementarities between the scientific and entrepreneurial methods (Sarasvathy & Venkataraman, 2011). Let us briefly examine and elaborate a few of these.

Purpose. The overarching purpose of science is to understand the universe. Some would argue it is the pure pursuit of truth (Quine, 1990). All the same, most would agree that the scientific method is useful to achieve human purposes, such as curing diseases and developing new sources of energy, and, in the case of the social sciences, building better institutions and solving societal problems such as poverty and illiteracy. Even when one sets out to build a world-destroying weapon such as the atomic bomb, the ostensible reason is defense against an unjust enemy and the cause of peace. If we take a more cynical view of the Manhattan project, such as world domination, that too is, at bottom, a human purpose, immoral or otherwise. Even post-truth social constructionists and ardent deconstructionists of science acknowledge its benefits and attest to it being a human endeavor (Kofman, 2018; Whooley, 2018).

Given that the scientific method is useful to achieve human purposes, it is interesting to note that the method explicitly eschews normative views about what those purposes ought to be (Feynman, 1956; Teller, 1998). At a more mundane level, science does not seek to set goals for humanity, even though it can help inform normative views about what they ought

to be. Mostly, science is used to achieve goals, irrespective of why or how those goals came to be, whether from moral philosophy, religion, socio-political processes, or the power dynamics of a flawed species. Science also points out physical constraints and universal limits on human action, often deterministic and immutable. The speed of light is a case in point (Penrose, 2006).

Entrepreneurship also is a useful method to achieve human purposes, but it need not—and, as a practical matter, does not—take a hands-off approach to shaping and demolishing what those purposes ought to be (Senge, Scharmer, Jaworski, & Flowers, 2008). Sometimes in tandem with and sometimes in rebellion to prevailing normative precepts, small groups of people act to reshape their environments, in the face of all predictive pointers to their failure. In practical terms, entrepreneurship offers ways not only to embody human desires, aspirations, and purposes into viable actionable goals, but it also explicitly offers a method to fabricate new goals worth achieving, without externally prescribing what they should be. Such unprescribed and unpredicted goals can then open up new purposes at higher levels (Simon, 1964). In other words, while the scientific method takes a top-down view of goals as subservient to existing purposes, the entrepreneurial method looks both ways up and down the hierarchy of goals and purposes, reshaping new ones as well as realizing and destroying extant ones.

Put succinctly, while science can constrain or enable human action, and inform understandings about human purposes, it does not provide a method to create new human purposes, or even to shape extant ones at higher levels. Shaping human purpose and imagining new ends worth achieving are, in contrast, all grist to the mill of entrepreneurship, especially effectual entrepreneurship.

COVID-19 offered a spectacular view of the distinction between the two. The scientific method was put to work in developing vaccines and succeeded—in a predictively controlled fashion. Getting those vaccines into human veins required a method of a different sort, entailing a wide variety of persuasive communication, coercive regulation, cocreated work arounds, and old-fashioned horse trading of financial and non-financial incentives—in other words, techniques of non-predictive control. Note also that the task at hand, at least in democracies, was not to cater to existing human preferences or markets, but to shape and cocreate them without the use of brute force. The entrepreneurial method is particularly suited for this task.

Content. The scientific method specifically seeks to discover general laws such as the second law of thermodynamics. The aim here is to precisely identify relationships that are universal and stable across time (Mirowski, 1991; Mitchell, 2000). Contrast that with effectual entrepreneurship where the emphasis is on locality and contingency (Sarasvathy, 2003). The scientific method, even when it cannot quite achieve the ideal of universality—that is, satisfy conditions of both necessity and sufficiency—seeks to at least enumerate necessary conditions. In the social sciences, for example, we seek to find stable explanatory variables that can reliably predict outcomes of interest, even if they are only necessary and not sufficient. Effectual entrepreneurship, as I have explained in depth elsewhere, consists in identifying and satisfying sufficient conditions, each of which may be unnecessary (Sarasvathy, 2021a).

As Powell (2002) explained, if we observe a house on fire, we can immediately conclude that there must have been flammable materials in or around the house that caused the fire. In

other words, flammable materials are necessary conditions for a fire to occur. However, there may be several possible such materials and even if we discovered the correct one, the mere existence of that is not sufficient to explain the fire. We will need at least one more causal link that set it alight, for example, an electrical short circuit.

There is an unstated assumption in current research that it is possible to find such necessary—even if insufficient—conditions that explain how and why certain ventures, strategies, organizational processes, and institutions succeed (Collis, 1994; Winter, 2003). However, empirical evidence for successes only indicates the fact that people managed to implement a set of conditions sufficiently stable for certain periods of time within certain domains. This is analogous to the provisional non-rejection of hypotheses in science rather than validation or reification of them, however strong and broad the consensus around that non-rejection.

For every Starbucks or Airbnb that shaped and cocreated a large new market or business model innovation, we can tell stories after the fact that suggest certain necessary conditions that led to their success. That sort of "just so story" ignores two complementary sets of facts. First, it is not easy to predict ex ante which one of the numerous so-called "disruptive" innovations are likely to succeed. In fact, the failure rate of venture capitalists whose job it is to make those predictions is 9 out of 10, about 90% worse than the failure rate of all firms in the economy which is closer to 5 out of 10 (Santarelli & Vivarelli, 2007). Second, the moment the success of one of these innovations is realized, there sprout up hundreds of smaller ventures that incrementally innovate on those "disruptive" models (Einav & Levin, 2010). A larger proportion of these (definitely larger than the 10% VC rate) survive and even endure over long periods of time (Jacobson, 1992; Posen, Ross, Wu, Benigni, & Cao, 2023). Both of these phenomena attest to the importance of sufficient conditions making necessary conditions untenable at best.

It is clearer to see now that while there may be some basis for dichotomizing them, there is also a yin and yang type relationship between the scientific and entrepreneurial methods, an overarching philosophical complementarity in terms of necessity and sufficiency. This complementarity is as important as the delicate differences (to hark back to Geertz quoted earlier), to understand and leverage both methods in navigating the PC space.

Focus. The explicitly stated focus of the scientific method is on the objective (Cohen, 2011). Not only can it be fruitfully applied only to clearly observable, precisely measurable, and reliably replicable data, being scientific also entails carefully parsing out findings from interpretations of those findings. Even when consensus is built through peer review processes, the emphasis is on not relying on psychological or intersubjective persuasion, but letting objectively collected data speak—hence, the exaltation of double-blind reviews and strictly controlled experiments as the gold standard of the scientific method (Hepburn & Andersen, 2015). The key argument here is to privilege exogenous validation from objective reality (even when that reality consists of peer reviews) and conscious attempts to exclude subjective motivations and social cliques. It is in this sense that competition becomes a discovery procedure leading to innovation, as Hayek and others have argued (Hayek, 2002). Collective collusions are more likely to lead to delusions. Rival views evaluated through objective evidence and fair competition is the only hope for progress in science—and in the marketplace.

Yet, whether in the natural or the social sciences, we simply cannot eschew what Adam Smith called "the principle to perswade" so rife in human nature (Smith, 1978 [1766]). This

is especially true in the forging of new ends. Even Hayek agreed on this when arguing for the creative power of free civilizations (Hayek, 1977). On the one hand, we are free to pursue our own individual ends in a free society; but, if we are to arrive at ends worth pursuing at a larger level of company, community, country, or the climate, cocreating them is the most productive way to progress. Almost every new end worth pursuing that has ever been fashioned, has required the building of intersubjective agreements, initially within very small groups, but growing progressively outward to larger circles as they get embedded in norms and/or regulations. Take for example, the suffragettes or gay marriage, or even the very invention of the term "human rights" itself, all of which are rather recent achievements in human history, unpredictable and even unconceivable in the millennia before (Hunt, 2007).

The non-predictive and cocreative process of the entrepreneurial method can currently be observed at various levels, group sizes, and institutional formats in ongoing ventures of tackling climate change. The ends-in-the-making here evoke Darwin's encounter with the finches on Galapagos islands, all in different interim stages of evolution, none quite speciated yet, and therefore unpredictable, yet being shaped by evolutionary forces. In the case of climate change, both causal prediction and effectual control can be seen driving actions and interactions. Both scientific and entrepreneurial methods are busy at work. Again, there is contrast as well as complementarity in evidence here. Science predicts the problem and even points to possible solutions, but non-predictive human action enmeshed in stakeholder interactions is the key to translating these into specific goals worth implementing.

Logic. The dominant logic of the scientific method is prediction (Friedman, 1953). Even though the philosophy of science may argue for science as the pursuit of truth in an objective sense, riding on the high horse of testable hypotheses and double-blind review processes, the history of science offers glimpses of human nature navigating the PC space just as entrepreneurs do. That means we should be able to find evidence for the use of techniques from all four quadrants of the CAVE framework by scientists as well as entrepreneurs.

A couple of recent publications have tried to show how and why teaching tools from science to potential entrepreneurs ought to be an important ingredient of entrepreneurship education (Camuffo, Cordova, Gambardella, & Spina, 2020; Zellweger & Zenger, 2022). History shows that both scientists and entrepreneurs navigate the PC Space. Yet, the method of science is focused on prediction, while the method of entrepreneurship emphasizes non-predictive control. Given that the story of science is a story of spectacular successes in human history, and the outputs of science have helped reshape the world we live in, it might be worth investigating why we may need the entrepreneurial method at all. This question is especially pertinent to the topic at hand because the underlying logic of lean startup is the logic of hypothesis testing, albeit its emphasis on validation rather than on falsification.

The successes of science attest to the fact that prediction does lead to control. In fact, prediction and control are inseparable in science—but is the rationale for the *method* of science what leads to good predictions? The method consists in unbiased observations and data collection, construction of testable hypotheses, tests of these through careful experimentation, and independent replication. However, practical implementation of these steps does not always lead to good predictions, let alone to good hypotheses worth testing. At best, the scientific method can only reject hypotheses and rule out bad predictions.

The history of science does not lack evidence of unproductive goose chases. Consider, for example, 200 years of chasing the hypothesis that heat is a substance until the formulation of the kinetic theory of heat (Goldstein & Goldstein, 1984); or centuries of miasma before coming up with the germ theory of disease (Kannadan, 2018); or moving beyond Newtonian mechanics (Dugas, 2012); or, in just the last century, the elusive pursuit of quantum gravity, string theory and other hypotheses to reconcile the incompatibility between quantum mechanics and general relativity (Maudlin, 2019).

The scientific method does not lead to disruptive new theories worth testing, just as it cannot lead to disruptive innovations in business or entrepreneurship. In other words, there are no sure-fire ways to create disruptive innovations. That does not mean that the scientific method is not powerful. The accomplishments of science as a method are not trivial, precisely because they work in the small on a daily basis even when big successes are rare. In fact, the incremental developments embodied in scientific tools and techniques are key to the big successes. Given an idea or insight or testable hypotheses, wherever those might come from, the scientific method can help test them and, in most cases, rule out the ones that actually do not work. That is not a trivial accomplishment. It is also not a predictable path to success—in science or elsewhere (Dasgupta, Schulz, & Gershman, 2017; Schulz, 2011).

When we historically examine how insightful hypotheses in science come to be, we are inescapably led to infer that "the trail of the human serpent is over everything" as James (1907) points out. In other words, even in science, we find the need for the entrepreneurial method in action. Again, a specific case may help enliven our inquiry.

In the 1600s, the austere astronomer Johannes Kepler was forced to hang around and ingratiate himself with the profligate Tycho Brahe, who had the leisure and wealth to collect enormous quantities of the data that could verify his hypotheses about the circular orbits of planets nested within Platonic solids. In other words, cocreative partnership between stakeholders was needed. Sadly, in Kepler's case this did not happen. Instead, he had to wait and steal the data after Brahe died, leaving the data to his heirs. Tycho's heirs were anxious to make as much money as possible out of the estate, and the impoverished Kepler realized that if he did not act immediately, he would never get to use most of Tycho's data. As he wrote in a letter in 1605, "I confess that when Tycho died, I quickly took advantage of the absence, or lack of circumspection, of the heirs, by taking the observations under my care, or perhaps usurping them" (Koestler, 2017[1959]: 280).

It took almost a decade of work analyzing the purloined data. The data almost entirely validated Kepler's theory of circular orbits—but not quite. There was a tiny, unexpected kink in the orbit of Mars; tiny, but consistent. Yet, Kepler was loath to throw away his theory that had taken up decades of painstaking work and start again from scratch, so he invested considerable time and effort pondering and investigating the possibilities of observational errors. Eventually, Kepler did restart from scratch and reluctantly hypothesized elliptical orbits. After finding they fit the data, he still mourned the loss of his beautiful theory of circular orbits and expressed his disappointment with the ugly ellipse calling it "a cart-full of dung."

Based on decades of studying the history of science, Herbert Simon would point out that coming up with hypotheses worth testing was clearly unexplained within the scientific toolbox. One of his favorite examples that can also be found in Lieberson (1985) is that rigorous statistical tests of variance can fully explain falling objects without ever invoking gravity. Galileo, therefore, was doing something more than following the standard model of the

scientific method. Another of Simon's favorites was the so-called serendipitous discovery of penicillin (Roberts, 1989). Simon's argument here was that years of development of expertise was necessary for this "serendipity" to occur. Someone without the expert eye—just as in the case of Kepler—might easily have thrown away the data, in this case, the petri dish with the unexpected mold growing in it. In other words, recognizing the unexpected and unwanted as unexpectedly valuable requires a stance of doing something with the "unpredicted" based on one's bird-in-hand. This usually consists in life experiences (Galileo and gravity), knowledge (Fleming and penicillin), and networks (Kepler, Brahe, and elliptical orbits).

It is clear that the scientific method, as well as the entrepreneurial method, can and should be part of entrepreneurial education. In fact, both should be part of education per se. As depicted in Figure 3, the scientific method occupies half of the PC space, and hence is vital to the development and use of predictive control. It does not, however, encompass the tools required to navigate the other half of the space. Nor do all of its own tools come from within, as we saw above in the case of coming up with hypotheses worth testing.

However, to the extent that science does lead to unrejected hypotheses, it embodies a causal logic, that is, a logic of predictive control. Similarly, to the extent that entrepreneurship cocreates new ends worth achieving and reshapes the environment it operates in—including new markets and new institutions—it embodies an effectual logic, that is, a logic of non-predictive control.

Effectuation Matters: Why and How

An effectual approach is vital to navigate the PC space because it is currently the only one that explicitly tackles the bottom right quadrant of non-predictive control.

How Do Expert Entrepreneurs Become Effectual?

For this we return to the Viaweb case derived from Paul Graham's interview with Jessica Livingston (Livingston, 2008). As Graham walks us through his experiences building the venture, every step he describes traverses different quadrants of the CAVE framework. For example, whereas Artix came from the visionary quadrant, in the beginning Graham is less aware of where he is treading. Every time something does not work out (art galleries do not want to go online; nor do retailers), he pivots (maybe catalog companies? Antique stores? Technical bookstores? and so on). His actions are more reactive, happening through adaptive trial and error. Eventually, the pivot to online stores is envisioned through media predictions and exapted from software he had already written for another market. Overall, his aims were not necessarily toward the reduction of prediction, except in writing code which is within his and Viaweb's control: "We gave them the software for free for as long as they wanted. We built their sites ourselves. If they needed to have images in them, we would scan the images. We were basically web consultants." (2008: 209)

As he manages to outlive small failures and cumulate small successes, he has his first moment of true awareness of the PC space—while product and customers begin fitting together well, "business" problems, that is, stakeholder issues, begin to dominate his days (investors ask for too much equity, acquisition deal falls through due to "clash of cultures," cofounder takes a job elsewhere, CEO search seems endless). Even as his sphere of control

increases and he is able to make it predictable, the only way to increase it further is to tackle the unpredictable through things within his control—and whenever that works, everything moves forward. Trying to predict the unpredictable stalls and stymies progress. Not trying to predict, but pushing the boundaries of what is already doable within his control, is faster, cheaper and, to his surprise, more enjoyable.

This was reinforced though another insight, this time about the difference between predicted versus actual commitments:

> That was my first introduction to something that turns out to be a very important lesson for startups: it's never a deal till the money's in the bank. So many things can go wrong with deals, and they all do. Before we ultimately got bought by Yahoo, we probably had nine or ten different acquirers that we were talking to, and things always went wrong for one reason or another. (2008: 212)

And later, a surprising lesson about control, without prediction, "You know, in retrospect I think the big problem with our investors was that we weren't forceful enough with them. I think investors like to be bossed around, like horses. It reassures them when you're in control." (2008: 214)

Although this is but one case from a single interview, this progression can be evidenced in the lived experiences of entrepreneurs across the globe, over different periods of time in history, within a variety of different kinds of markets and sociopolitical environments. The progression typically moves from (1) initial trial and error through the PC space, driven sometimes by visionary, sometimes predictive or even sheer reactive desperation at other times, to (2) particular insights at particular moments when things start working and becoming more predictable on the one hand, yet concurrent with uncertain unpleasant surprises that hit the venture. Both invoke a sensitization toward the pervasiveness of unpredictability and the value of committed stakeholders. Eventually (3) these insights coalesce into a deep appreciation for control itself as strategy. Thereon, expert entrepreneurs begin to sort almost everything—resources, events, relationships, contingencies—in terms of what is within their control and what is not, actively seeking to minimize reliance on prediction, except perhaps occasionally as a communication device.

A note of caution is warranted here. Any moment along this random walk across the PC space, an entrepreneur might quit before getting to an appreciation of non-predictive control or even a clarity about the contours of the space. It costs time and perseverance to learn from experience alone as a teacher. It takes even more time and effort to reap the benefits of such learning. That is exactly why a rigorous understanding of entrepreneurial expertise is crucial. Based on it, we can help construct a path of deliberate practice and fabricate training tools that shorten the random walk for novices, as well as shore up against premature quitting and futile churning (Ericsson, 2018). Once again, let us remember that expertise is not about the success or failure of any given venture, but the success of entrepreneurs, irrespective of any given venture they build (Dew, Ramesh, Read, & Sarasvathy, 2018).

Lean Startup and Effectuation: Overlaps and Distinctions

Having examined the larger landscape, namely the PC space, which different toolboxes and techniques of entrepreneurial practice help navigate, and also having investigated

how and why the scientific and entrepreneurial methods are needed and used through history, we can now spell out practical overlaps and distinctions between lean startup and effectuation.

Both lean startup and effectuation (a) argue against business planning; (b) emphasize customer development; (c) seek to reduce time to market; and (d) can be used for innovation in startups as well as larger organizations. However, as summarized in Table 1, the two also differ in a number of important ways, each of which harks back to their distinct non-overlapping locations within the PC space. Let us delve into distinctions after discussing overlaps.

Overlaps Between Lean Startup and Effectuation

Business Planning. Both lean startup and effectuation point to flaws in traditional business planning. In his working guide for writing a winning business plan, Schilit (1987) advised an executive summary plus 10 sections spanning marketing, financial forecasts, team development, and risk analyses. Each of these requires data gathering through methods such as surveys and focus groups, combined with financial forecasting leading to detailed budgets, milestones, and timelines. Until very recently, this type of business plan was the only standard deliverable. University courses in entrepreneurship were almost entirely organized around teaching students to write them.

Every one of the expert entrepreneurs I studied had something nasty to say about this kind of planning based on market research and financial forecasts. All considered the business plan a necessary evil for obtaining formal funding. As one of them exclaimed, "Of course you gotta do it, I have written hundreds of these, but God forbid you believe it's a *plan*!" (Sarasvathy, 2022[2008]: 73-4). This exasperation with business planning also led to the lean startup model. As Ries (2011: 31) explains, "Unfortunately, too many startup business plans look more like they are planning to launch a rocket ship than drive a car." How experienced and/or expert entrepreneurs arrive at their disdain for business plans might vary as much as the ways in which they express that disdain. Both lean startup and effectuation heed that disdain and seek to offer alternatives to traditional business planning.

Customer development. Both lean startup and effectuation offer techniques for customer development. Interestingly, while effectuators go deeper in their skepticism of all predictive information, lean startup offers a deeper dive into prediction: "Validated learning is the process of demonstrating empirically that a team has discovered valuable truths about a startup's present and future business prospects. It is more concrete, more accurate, and faster than market forecasting or classical business planning" (Ries, 2011: 48). This concept of validated learning can be traced back to the customer development model in Blank (2005, 2013).

The idea behind validated learning and customer development consists in going beyond traditional market research (through surveys and focus groups for example) to systematically test customer preferences and behavior through experiments such as those used in science. As Ries (2011: 66) puts it, "we need a method for systematically breaking down a business plan into its component parts and testing each part empirically." Testing usually takes the form of A/B testing, that is. dividing customers into random groups and offering them two options that are similar on everything except for one feature that is being tested or validated. In practice, as Shepherd and Gruber (2021) point out, startup entrepreneurs tend to be more

Table 1
Distinctions Between Lean Startup and Effectuation

Startup Features	Lean Startup	Effectuation
Initial Idea	Not specified where ideas come from or how to choose between them. Recently, however, the Market Opportunity Navigator was added as the fourth tool.	Although it is not necessary to start with an idea, the bird-in-hand principle does provide guidance.
Hypotheses	Although the criteria for good hypotheses are well-specified, the generation of such hypotheses is not a well specified technique, even in scientific research, let alone in lean startup.	This is a non-problem since there is no hypothesis generation or testing required in effectuation.
Customer Development	Focus on searching for, finding, and developing customers. However, the problem of unpredicted customers (who are therefore not talked to or developed) is ignored.	Focus on talking to anyone and everyone willing to talk to the entrepreneur. Furthermore, not only customers, but any and all stakeholders can self-select and move the effectual process forward.
Pivots	When customers reject hypotheses, need to pivot arises. No specification on how many pivots might be needed nor how to halt the process.	Process moves forward only through commitments that make the next step affordable loss. While effectuators may not want to commit to something a self-selecting stakeholder offers, to the extent effectuators are willing to change their goals, it takes only a few substantial commitments for the process to converge.
Product Market Fit	Assumes markets exist exogenously and can be "found."	Seeks to shape and cocreate markets endogenously as well as find them where they already exist.
To Pivot or Not to: Psychological Issues	Psychological issues related to giving up one's vision/passion in order to pivot are not resolved.	Psychological issues related to goal change can be hurdles. However, the crazy quilt and pilot-in-the-plane principles offer the possibility of returning to one's vision/passion later after these become affordable loss.
Failure	Promises higher probability of success without specifics on failures along the way.	The lemonade principle specifically tackles failures as part of the process. Also, success/failure of venture does not equal success/failure of entrepreneur.
Uncertainty	Useful when prediction is possible.	Useful under uncertainty, especially Knightian uncertainty.

focused on confirming rather than falsifying their hypotheses. This is not always a bad thing. In some cases, even a belief-model of hypothesis testing could be beneficial (Shepherd, Haynie, & McMullen, 2012).

In effectuation customer development is part of the crazy quilt principle where the aim is to pre-sell the product, even before a prototype may be ready; and if not pre-sell, at least to get pre-commitments from customers. As one expert entrepreneur put it, "the best form of market research is actual sales" Gianforte (2005: 21). Even though the techniques differ, with lean startup leaning into better prediction and effectuation focused on pre-selling and partnering, both lean and effectuation do highlight the importance of customer development early on.

Reduction in time to market. Simply doing the two things above, (a) not having people research and write elaborate business plans and (b) engaging in customer development

sooner rather than later, enables both lean startup and effectuation to reduce time to market. In the case of lean startup, customers rejecting hypotheses might result in pivots and more tests that could add to the time to get to product market fit. However, it is still likely to be quicker to get to market than writing elaborate business plans and later finding out no one actually buys the product or service.

In effectuation, the issue is not whether customers reject any given hypothesis or product feature. Instead, the idea is to build whatever actual customers actually pay for. Here, too, it may take time to find a customer who pre-commits. However, since effectual entrepreneurs are explicitly open to changing their goals, they can assent to a wider variety of products and services sooner, thereby staying engaged in building only products customers actually want.

Therefore, both lean startup and effectuation provide techniques to reduce time to market, compared to traditional business planning.

Innovation beyond startups. Lean startup methods are used in larger organizations for product development and the commercialization of new technologies. Effectuation, too, can be found in corporate venturing, new product development, and in research and development (R&D) departments in established companies (Brettel, Mauer, Engelen, & Küpper, 2012). Furthermore, effectuation has been shown to be in use in domains beyond business. Olive-Tomas and Harmeling (2020) present the use of effectuation by Picasso and Braque in building the Cubism movement in art; Murphy, Danis, and Mack (2020) show how the Toquaht nation engages in community effectuation; and several studies evidence the use of effectuation in social enterprises (Corner & Ho, 2010; Johannisson, 2018) and tackling large societal problems requiring collective action and polycentric governance (Sarasvathy & Ramesh, 2019).

Distinctions Between Lean Startup and Effectuation

Initial idea. There are several studies examining idea generation and opportunity recognition in entrepreneurship. In fact, the latter can be traced back to the widely accepted definition of the field as a whole (Venkataraman, 1997). In recent research, models explaining the discovery of opportunities are beginning to be related to methods such as design thinking and lean startup. That has led to identifying gaps in these models as well as examining their usefulness. For example, noting a deficiency in lean startup as to where ideas come from, Gruber and Tal (2017) developed the Market Opportunity Navigator (MON) as an important learning layer within lean startup. MON offers a wide lens perspective for entrepreneurs to come up with a portfolio of market ideas, and then helps them to choose the one with highest potential as the starting point for applying lean startup.

Effectuation, in contrast, suggests that entrepreneurs begin with their bird-in-hand—namely, who they are (identity), what they know (knowledge), and whom they know (network)—and then come up with things they can immediately do/make within their affordable loss. The point here is not to overthink or spend too much time in idea generation or opportunity identification mode. Instead, the focus is on doing the doable based on things already within one's control. The rationale for this is the belief that (a) it is futile to predict which ideas are more or less likely to succeed, and (b) ideas are almost immediately going to change as effectuators engage in opening the door to commitments from stakeholders.

In a Youtube video, serial entrepreneur and cofounder of Netflix, Marc Randolph, attests to the futility of trying to predict which ideas will work and which will not, as follows:

> Nobody knows anything, true in Hollywood and I believe true almost any place people are trying new ideas. I mentioned before that Netflix is just one of seven startups of mine but if you'd asked me on Day 1 for each of these which was going to be the big hit and which was going to be the complete failure, I promise that I could never have told you. Nor could anybody else. (https://www.youtube.com/watch?v=ObJx_mY4I8k)

In short, while lean startup provides little guidance on coming up with the venture idea, and MON emphasizes the need to identify which idea one ought to work on, effectuation proposes moving into action and interaction immediately, doing whatever is doable for affordable loss. If the effectuator comes up with more than one idea, they can choose one based on their subjective preferences or else try to enroll stakeholders for all of them. Depending on which idea gathers enough commitments to make their next steps affordable loss, the effectual process itself leads to the most doable venture without the entrepreneur first having to predict which one is likely the best.

Hypotheses. Another major issue that lean startup does not provide good guidance on is the formulation of hypotheses. Shepherd and Gruber (2021: 973) highlight this as follows:

> More specifically, the design of a business model presents a "leap of faith" as it requires an entrepreneur to create a set of assumptions regarding whether a (potential) customer problem can be solved by a product or service that delivers value to customers and whether value-generating new business can be established. (Osterwalder & Pigneur, 2010)

In this connection they allude to the fact that even the MON model focuses on where to play and not on how to play. Hark back to the fact that the history of science also attests to this difficulty. As we saw earlier, the scientific method, too, does not provide clear guidance on where good hypotheses worth testing come from or how to generate them from scratch.

This problem simply does not exist in effectuation since prediction is unnecessary and irrelevant to the process. Therefore, not having to come up with hypotheses to test, especially under high uncertainty, is a useful feature of non-predictive control. It raises the question, however: If not hypothesis testing, what does the effectual entrepreneur do?

While effectuators use any idea they come up with as an opener in conversations with people, their task is to quickly move to match their bird-in-hand to anything and everything a self-selecting stakeholder is willing to commit to. It might turn out that there is not a big market for any given product a customer might want, but so long as they are willing to pay enough for it, or a supplier is willing to make a close-to-free batch of it, or investors are willing to keep providing just enough funding for it, effectual entrepreneurs can continue building them, as in the case of Viaweb that we examined earlier. Even prototypes and MVPs are underwritten by stakeholders in effectuation and hence are not a priori conditions for talking to customers, except when entrepreneurs can easily make them within their affordable loss, and want to do so.

Customer Development

Furthermore, while hypothesis testing is primarily a matter of customer development in lean startup, the key stakeholder in effectuation need not even be a customer. There is an implicit assumption in lean startup that we can predict in advance the set of all possible customers.

Since effectuation emphasizes that we cannot know who may not turn out to be a customer, we need to talk to anyone and everyone who will talk to us. In fact, any and all stakeholders, not only customers, can kickstart the effectual venture and keep it going through market cocreation. Consider the case of Virgin Atlantic. Richard Branson called Boeing to ask to lease airplanes and their assenting made it affordable loss for him to start the venture.

Another issue in lean startup concerns the customer that the startup may not know or even imagine exists. In other words, predictions of who the customer(s) might be are often wrong. In the case of the CD-ROM, for example, the market for music was imagined almost a decade after its invention and use as data storage. Even the internet was not seen as technology for commerce for about 15 years (Sarasvathy & Dew, 2005). Uncertainty exists not only within extant markets, but often takes the form of markets that simply do not yet exist. The only way to cocreate markets no one has even imagined yet is to interact with any and all people willing to come together to build things for affordable loss, without clear predictions of who the customers might be.

Pivots. Lean startup seeks to gather high quality predictive information about customers and related aspects of the business model. It provides detailed guidance for breaking down the business plan or imagined business model into constituent parts and testing assumptions and hypotheses related to these. Whenever these assumptions and hypotheses are rejected by the tests, the lean startup entrepreneur has to pivot and come up with new ideas and features of the business model and start testing these. In other words, information gathered through A/B and other types of tests (e.g., surveys, interviews) constitute the engine of the lean startup.

As already mentioned, commitments from self-selected stakeholders drive the effectual process. The effectual entrepreneur talks to anyone and everyone with the aim of every conversation being to get to a deal, a real commitment that makes the next step affordable loss. Note that commitments (Sarasvathy & Dew, 2005) are a kind of information too, yet they are more than that. They are sufficient conditions to get the next step in effectual cocreation done. In other words, commitments are not predictive of future deals. They constitute the actual deal in the present that allows startups to make the next feature of a new future.

One could argue that both lean startup and effectuation may lead to churn, or endless pivoting, or, put another way, that they present a "halting problem" in the startup process (Fischer & Reuber, 2011). Without taking a position on whether that is a problem in lean startup, I contend that it is not a problem in effectuation. The effectual process moves forward almost exclusively through commitments from self-selecting stakeholders (Van Mumford & Zettinig, 2022). Note that the entrepreneur is one of those stakeholders. Hence, the effectual entrepreneur can unilaterally commit up to the maximum level of his or her subjectively determined affordable loss. In other words, the effectual process halts either when entrepreneurs run out of their affordable loss, and/or no one else commits anything to the venture (Sarasvathy & Dew, 2005).

Because pivoting in effectuation can happen only through sufficiently large commitments, the number of pivots is necessarily few. In over 200 case studies from all around the world, we have found evidence for only a handful of changes from the original venture idea. As the venture grows, a few more pivots might happen. These later pivots take the form of product line extensions as well as the cocreation of new markets. Another way to say this is that effectual ventures evolve. They do not necessarily pivot.

Product market fit. The main objective in lean startup and related approaches is to find product-market fit. This assumes markets exist exogenous to entrepreneurial action. Hence what is needed is a validated search process, carefully designed and executed using A/B and other testing of assumptions and hypotheses.

As conceptualized in depth in Sarasvathy and Dew (2005) and Karami and Read (2021), and evidenced empirically (Kaartemo, Kowalkowski, & Edvardsson, 2018; Ko, Roberts, Perks, & Candi, 2022; Read, Dew, Sarasvathy, Song, & Wiltbank, 2009), the effectual process seeks to shape and cocreate new markets, not only penetrate and occupy existing ones. Cocreation not only includes ways to fit products to markets, but also ways to *make* markets that fit entrepreneurs' own as well as their self-selected stakeholders' birds-in-hand.

To pivot or not to pivot. As Shepherd and Gruber (2021) discuss, an interesting variation on the theme of pivoting has to do with psychological issues that make it hard to do. On the one hand, entrepreneurs tend to be passionate about their ventures. They are also exhorted to inculcate in themselves traits like perseverance, grit, and resilience. These are not qualities that comply easily with pivoting. Add to that certain traits from the dark side, such as vanity or narcissism, and pivoting or interpreting disconfirming tests can become a substantial hurdle.

This is also one of the problems in training entrepreneurs to effectuate. Novice entrepreneurs quickly fall in love with their own visions of building the venture and find it difficult to listen to, let alone actually open up to allow stakeholders to self-select, even when they are willing to make substantial commitments. One way we tackle this problem in effectuation is to get entrepreneurs to see that they get more than one shot at the pot, so to speak. By cocreating with current stakeholders whatever they are committing to cocreate, effectual entrepreneurs need not necessarily abandon their own ideas and vision. They can work concurrently on their original idea, or return to building it after they have accumulated enough resources through the effectuated venture to make it affordable loss. All the same, effectual entrepreneurs need to learn to let the crazy quilt principle drive the process before engaging the affordable loss gear on their pet passions—sometimes much later.

Here is a story from one of the expert entrepreneurs:

> I just wanted my own lab. But I did not have the money to build it. Nor could I raise the money through grants. In desperation I turned to private investors. The ones I talked to would get excited about my unique technical background but wanted me to build other products rather than fund my lab. Eventually I agreed and built a three billion dollar company based on their ideas. But could not get back to building my own lab until I found a CEO to replace me. That took years since there are not many people with technical expertise in my area and I had to train my successor from scratch.

Discussion and Implications for Future Work

In this section I provide brief outlines of implications from the above exposition to entrepreneurship education as well as future research. Let us begin with considering the role of performance in informing education content.

Implications for the Role of Performance in Entrepreneurship Education

As it says in its title, lean startup claims to increase the probability of success of new product development both in startups and larger organizations (Ries, 2011). These claims are yet to

be empirically tested. However, academic research in entrepreneurship is rife with studies claiming to explain venture survival and success as well as other aspects, more narrowly and precisely defined as impacting performance variables of interest to entrepreneurship such as idea generation, opportunity identification, gestation activities, and obtaining funding. There is also a rising focus on relating variables that are correlated with the starting and survival of ventures to entrepreneurship education (Eesley & Roberts, 2012; Elert, Andersson, & Wennberg, 2015).

Recently, some studies argue for specific elements that ought to be part of entrepreneurship education based on experimental evidence, claiming to correlate them to success. As mentioned earlier, one emphasizes the importance of teaching scientific hypothesis testing (Camuffo et al., 2020). Another set of studies relate psychological variables, such as personal initiative, to performance (Frese et al., 2016; Unger, Keith, Hilling, Gielnik, & Frese, 2009). Studies have also claimed positive relationships between aspects of effectuation and entrepreneurial performance (Deligianni, Voudouris, & Lioukas, 2017; Laskovaia, Shirokova, & Morris, 2017; Read, Song, & Smit, 2009; Shirokova, Osiyevskyy, Laskovaia, & MahdaviMazdeh, 2020). I have argued, too, for the higher probability of innovation and lower costs of failure as important performance implications from the use of an effectual approach.

All the same, given the larger historical discussion of the scientific method and its relationship to the entrepreneurial method in the PC space, it might be worthwhile reconsidering the role of such studies in providing the main content of entrepreneurship education. Holding up evidence of positive relationships between any of the toolboxes and measures, such as the rate of starting ventures and success in building them as a rationale to including them in entrepreneurship education, is akin to developing science curricula based on how many students become scientists and build breakthrough inventions.

I am not arguing for giving up studies of entrepreneurial performance. I am questioning their value as the main rationale for choice of content in entrepreneurship education.

What is the alternative, you might ask? The history of science offers good alternatives. For each element of content, we need to make a theoretical case with internally consistent logic. Every element in the scientific method embodies such logic. The "care" in careful data collection has to do with independent replicability by others. Replication is needed to ensure objectivity, to avoid contamination through subjective biases. Likewise, testing hypotheses allows for objective reality to be prioritized over subjective aspirations. Hence the need for falsifiability as the key criterion for good theorizing. Techniques of controlled experimentation embody the best of these internally logical criteria and elements. Hence the randomized controlled experiment is the gold standard and the vehicle through which the scientific method is taught—not because it leads to success, but because it is consistent with the fundamental logic of science as a method.

Most importantly, the scientific method is taught to *everyone*, not only to potential scientists. As argued above and elsewhere, I would like a similar ideal for our efforts in building rigorous and relevant entrepreneurship education.

Implications for Future Research

In addition to expanding interest in education and performance, entrepreneurship as a field has taken an important and interesting turn toward a deeper understanding of practical tools and how these may connect with and inform research and policy (Berglund et al.,

2020; Campos et al., 2017; Camuffo et al., 2020). The current special issue is a case in point, and the launching of the *Journal of Business Venturing Design* is yet another step in this direction.

As Gigerenzer (1991) showed, this move away from borrowing from other disciplines and toward developing practical tools from the field into new theories finds healthy parallels in the history of science. There are at least two new pastures for exploration that open with such a move in entrepreneurship. First, we may want to pay closer attention to methods of interactions—not only between entrepreneurs and customers, but between entrepreneurs and all their stakeholders. Recent conceptualizations for examining phenomena such as stakeholder enrollment (Mitchell, Israelsen, Mitchell, & Lim, 2021; Suddaby, Israelsen, Robert Mitchell, & Lim, 2023) offer doorways to new empirical work. Second, access to content analyses tools based on artificial intelligence allows us to begin examining vast quantities of as yet unanalyzed data on conversations, conflicts, complaints, and every form of communication between entrepreneurs and their stakeholders, potential and actual.

Most importantly, the fertile interest in methods we are currently embracing offers the field an opportunity to extract specific tools of dyadic and dynamic interactions between entrepreneurs and their stakeholders, ventures and their environments, as well as economic and non-economic benefits and values. The tools we have currently identified are but the tip of the iceberg of possible tools. Each of these new tools that we will extract from entrepreneurial practice will likely contain insights for dealing with a variety of different kinds of uncertainties. By elucidating these in careful tiered progression, we should be able to weave them together into frameworks and theories that can coevolve with ideas from all the social sciences. Such careful tiered progression has to be the way forward to building entrepreneurship as a method.

Conclusion

The scientific method is necessary but not sufficient, even for doing science. The history of science readily attests to the use of the entrepreneurial method and tools from all four quadrants of the CAVE framework. On the flip side, the scientific method is also useful but definitely not sufficient for doing entrepreneurship. In a world in which uncertainty is increasing along multiple dimensions, prediction is often neither feasible nor desirable. In such a world, techniques of non-predictive control, locally (in particular contexts), and contingently (for certain periods of time), are invaluable for the fashioning of valuable new ends no one has yet imagined. Thankfully, these can still be cocreated with what we already have within our control.

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The Minimum Viable Product (MVP): Theory and Practice

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Building and deploying a minimum viable product (MVP) is often considered a necessary step in the venture development process. Although MVPs are ubiquitous in practice, foundational scholarly work on MVPs is virtually nonexistent. We leverage and build upon the lean start-up literature and the scientific approach to entrepreneurship to develop theory related to the dimensionality, forms, risks, and trade-offs of MVPs. We first define and identify the conceptual boundaries of MVPs and explain the relationship between MVP dimensionality and MVP development decisions. We then specify how MVP risks emerge and how these risks relate to the trade-off decisions that entrepreneurs must grapple with when building and deploying MVPs. We conclude by presenting future research opportunities on this important but previously overlooked phenomenological artifact.

Keywords: *minimum viable product (MVP); lean startup; entrepreneurship; product testing; experimentation; theory development*

The "lean start-up" framework is a theory of entrepreneurial management that encourages innovators to focus on experimentation during new venture development (Shepherd & Gruber, 2021). It is an opportunity-centric actionable theory that might be best viewed as "an application

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of the scientific method to entrepreneurship" (Blank & Eckhardt, 2024: 2). The lean start-up framework consists of several practical tools that work together to facilitate meaningful start-up progress. These tools include the Business Model Canvas (Osterwalder & Pigneur, 2010), the Market Opportunity Navigator (Gruber & Tal, 2017), iterative customer development procedures (Blank, 2010), and the minimum viable product (MVP ; Blank, 2003, 2010; Ries, 2011), the last of which is the focus of this article. We define the MVP as a tangible product or service representation with a limited number of features deployed for the purpose of learning about the value of a potential solution via experimentation.

The practical application of lean start-up tools has been widespread, yet these tools have received varying attention in the academic literature. In particular, academic research on MVPs has been scarce, prompting Shepherd and Gruber (2021) to call for research on MVPs to bridge the divide between entrepreneurship practice and theory. These scholars assert that research on MVPs is likely to reveal insights about the development and best use of MVPs for hypothesis testing and advancing the start-up process (Shepherd & Gruber, 2021). Blank and Eckhardt (2024) suggest research should explore the important trade-offs associated with lean start-up tools and experimentation. To enhance lean start-up theory, they also call for integration of the lean start-up framework with scholarly research rooted in entrepreneurship and innovation literatures.

In this research, we draw directly from the literature on the lean start-up framework (Contigiani & Levinthal, 2019; Felin, Gambardella, Stern, & Zenger, 2020; Shepherd & Gruber, 2021) and supplement it with recent insights pertaining to the scientific perspective of entrepreneurship (e.g., Camuffo, Cordova, Gambardella, & Spina, 2020; Koning, Hasan, & Chatterji, 2022; Zellweger & Zenger, 2023) to develop theory related to the dimensionality, forms, risks, and trade-offs of MVPs. In so doing, we contribute to the scholarly conversation related to the lean start-up by presenting an integrative definition of MVPs, specifying MVP dimensionality, identifying MVP forms, and explaining how their complex interconnections influence development and deployment decisions for entrepreneurs. Additionally, we put forth propositions that explain when and why MVPs might generate intrinsic risks for new ventures. Drawing upon the literature focused on scientific experimentation, we theorize how entrepreneurs can mitigate MVP risks using experimental best-practice strategies. Overall, our work is aligned with—and extends—the prior scholarly work on the lean start-up. We conclude our article by encouraging future research to build upon and test the conceptual model of MVPs that we present herein.

Unpacking the MVP: Initial Conceptual Foundations

The MVP is one of the core foundational tools of the lean start-up framework. The term "MVP" was originally coined by Frank Robinson of SyncDev (Blank & Eckhardt, 2024), and practical instruction on its applicability was initiated two decades ago (Blank, 2003). In some ways, the MVP serves as a cornerstone to the lean start-up framework given its history and interconnections with the broader suite of lean start-up tools. Yet, it has been underexplored by scholars. There are still ambiguities related to its boundaries, dimensions, scope, deployment tactics, risks, and connections with the other lean start-up tools. Shepherd and Gruber (2021) note that if the scholarly understanding of MVPs is to advance, foundational research is needed to clarify the dimensions, contingencies, and domain of this important entrepreneurial artifact.

Our first aim in this article is to define and distinguish the MVP from other related artifacts. Consistent with best-practice recommendations for phenomenon-based theorizing (Fisher, Mayer, & Morris, 2021; Ployhart & Bartunek, 2019), we unpack the key elements of the MVP, including its dimensionality, forms, and boundaries.

Defining MVPs

Over the past decade, several definitions, each with varying degrees of specificity, have been offered for MVPs. In *The Lean Startup*, Ries (2011: 77) defines the MVP as "a version of a new product, which allows a team to collect the maximum amount of validated learning about customers with the least effort." Blank (2013) also emphasizes minimal effort as a quality of MVPs by noting that MVPs ideally are composed of just those features (and no more) that allow the artifact to be deployed for testing. York and Danes (2014) built on these definitions by specifying the importance of user involvement in the MVP. They define the MVP as a "set of minimal requirements which meet the needs of the core group of early adopters or users" (York & Danes, 2014: 25). Camuffo et al. (2020: 566) describe the MVP as "a preliminary basic version of the offering with just enough features to let customers experience it and assess their willingness to pay for it." Martins Pacheco, Vazhapilli Sureshbabu, Nürnberger, Durán Noy, and Zimmermann (2021) identify the MVP as a tool that enables testing of an idea with limited resources early in the venture development process. The definitions presented here are varied but share a common thread around "minimum features," "efficient learning," "external deployment," and "experimenting with users." Building upon these initial attempts to define the MVP, we propose a definition that synthesizes each of these aspects. Taken together, we define the MVP as

> a tangible product or service representation with a limited number of features deployed for the purpose of learning about the value of a potential solution via experimentation.

By "tangible," we assert that an MVP exists as a concrete instantiation of a concept (cf. Berglund, Bousfiha, & Mansoori, 2020) that can be perceived by at least one of the senses (i.e., the MVP can be seen, heard, or felt, etc.). Merriam-Webster (2021) defines tangible as "easily seen, recognized, or capable of being perceived." Tangibility thus constitutes an object's existence beyond one's imagination and its perceptibility by the senses. MVPs have only a limited number of features and by design are minimally developed to include only essential elements to test a potential solution. This implies that entrepreneurs must make trade-off decisions about what features to include and exclude in their MVPs. MVPs become useful only when they are deployed externally to test aspects of a concept. MVPs thus exist at the interface between the venture and the external market environment (cf. Simon, 1996). They are deployed for learning via experimentation at this interface (cf. Burnell, Stevenson, & Fisher, 2023; Zellweger & Zenger, 2022). MVPs are future oriented—they are used to test potential market opportunities, in accordance with the understanding that there is a high degree of uncertainty related to the value of a potential solution (cf. Dimov, 2016; Knight, 1921). By "value of a potential solution," we assert that entrepreneurs are concerned with measuring a potential product or service's worth for a set of potential use cases (Rindova & Petkova, 2007), including the discovery of whether potential customers might be willing to pay for a potential solution (Camuffo et al., 2020).

The Conceptual Distinction Between MVPs and Prototypes

MVPs and prototypes share conceptual overlap, yet there are also several important distinctions. We focus on MVPs (rather than reintroduce the prototype construct into the literature) because the MVP is a core tool within the lean start-up framework (Shepherd & Gruber,

2021) and because the MVP is used extensively by entrepreneurs (Blank, 2013) and entrepreneurship educators (Blank & Eckhardt, 2024). In line with recent work (cf. Camuffo et al., 2020; Shepherd & Gruber, 2021), we position MVPs as a distinct entrepreneurial artifact.

Prototypes have largely been studied outside of the entrepreneurship literature (e.g., Houde & Hill, 1997; Thomke, 1998; Wall, Ulrich, & Flowers, 1992). Much of this prior scholarly work on prototypes does not reference the critical external elements of the lean start-up framework. Prototypes instead are often presented as internal testing tools. That is, they are mainly used for internal evaluations of product manufacturability or engineering concept development, what Song and Montoya-Weiss (2001: 77) refer to as "in house sample product testing." Rothaermel and Deeds (2004) contend that the ideal outcome of prototype exploration is the development of a patent. Davila (2000: 389) notes prototypes are used "to assure manufacturability" within an organization and that prototypes often require meaningful capital outlays.

In contrast, MVPs are ideally deployed with relatively little capital outlay (Blank, 2013) and with a precise purpose in mind: to learn about the market potential of a solution (i.e., product or service offering) via experimentation (Blank & Dorf, 2012; Contigiani & Levinthal, 2019). A key distinction between prototypes and MVPs relates to how these objects are positioned relative to stakeholders. MVPs are externally facing and used for market validation, testing, and learning about product-market fit (Blank, 2013; Blank & Eckhardt, 2024). Prototypes are internally positioned and used mainly to assess manufacturability or patentability. Overall, the key conceptual and pragmatic differences between MVPs and prototypes lie in their inherent purposes, internal versus externally facing positions in relation to stakeholders, and their integration within the lean start-up framework.

Dimensionality: MVP Realism Along Three Dimensions

Building from the innovation literature (Eisenman, 2013), we propose that MVPs vary in their realism, which is the degree to which the MVP is comprehensive relative to the anticipated final form of a product or service. MVP realism consists of three interconnected dimensions: aesthetics, functionality, and symbolism.

Aesthetic realism. Aesthetic realism accounts for representations of the final product as perceived by one of the five physical senses (i.e., vision, touch, smell, hearing, or taste). It is intrinsically linked with ontological objectivity, that is, the manifestation of what something is as it relates to one of the five physical senses, independent of its function or subjective meaning (see McBride & Wuebker, 2022). MVPs are simply a representation of a concept used for testing, and the final product or service will likely be quite different from the MVP in terms of its aesthetic qualities.

Although aesthetic aspects of an MVP might be perceived by a user through any one of the five physical senses, aesthetic realism of an MVP in practice often comes from visual representations (i.e., "looks like"). This includes aspects such as the color, size, shape, and symmetry that manifest objectively in the physical or digital world (cf. Creusen & Schoormans, 2005; Koning et al., 2022; Rindova & Petkova, 2007). For example, in 2013, founders of the fitness company Peloton deployed an MVP online with high aesthetic realism through visual image representations of their exercise bike concept. Even though the final product had not yet been built, the visual representations presented by the venture exhibited aesthetic design features, such as a large flat-screen monitor, a micro-adjustable seat, fitness data wireframes, and the novel connected interface with the virtual instructor for which Peloton later became famous (see the

appendix).[1] Examples of MVPs with aesthetic attributes beyond visual senses could include a podcasting start-up testing audio content or a vitamin water start-up testing different flavor profiles.

Functional realism. Functional realism relates to features that enable potential users to experience functional aspects of a potential product or service. Functional realism is tangible only in instrumental form (Creusen & Schoormans, 2005; Eisenman, 2013). For example, functional features can include the particular aspects of a chair that enable sitting, characteristics of a doorknob for opening, or the prongs on a fork for eating (Norman, 2013). Functional realism is the degree to which a feature allows a customer to accomplish a pragmatic goal or aim. If a person wants to sit, a chair allows for the accomplishment of this aim. Functional realism is prioritized when the entrepreneur wants to demonstrate to external stakeholders that the MVP has some level of pragmatic usefulness.

An example of an MVP with high functional realism comes from Vesta Stoudt, the inventor of duct tape. Stoudt was a package worker in a plant that had a contract with the U.S. Navy. During her time working for the plant, she conceived of an idea for a new cloth-based waterproof tape. Because she envisioned her first customer as the U.S. Navy, a pragmatic organization, Stoudt focused on creating an MVP that showcased functionality over aesthetics or symbolism. When she struggled to get her supervisors to take her seriously, she sent a sample of her MVP and wrote directly to President Roosevelt. Roosevelt was so impressed with how the tape could be used to seal ammunition crates for shipping, he forwarded her letter to the war production board so it could support her to further develop her MVP and eventually begin procurement of the product.

Symbolic realism. Symbolic realism relates to epistemological rather than ontological features of the MVP. Whereas ontology is concerned with what something is, epistemology is concerned with what one thinks or believes figuratively or metaphorically about that thing (McBride & Wuebker, 2022). Entrepreneurs rely on symbolic realism to evoke cognitive representations, shared beliefs, cultural routines, or allegories in the minds of those who interact with the MVP (i.e., "feels like" or "reminds me of"). This includes cultural or procedural meanings associated with the potential product beyond its functional or aesthetic features (Lounsbury & Glynn, 2001) including its conformity to institutionalized categories and designs (Hargadon & Douglas, 2001). Symbolic features can also evoke meanings associated with the personal identities of potential users (Rafaeli & Vilnai-Yavetz, 2004). Symbolic realism triggers users' awareness of hierarchical standing and one's identity within a socially constructed system of values, rituals, beliefs, and practices.

We posit that due to their power in eliciting cultural resonance, MVPs that have a high degree of symbolic realism can be powerful tools when it comes to evaluating how users respond to representations experientially, procedurally, or socially. For example, the founders of the unsuccessful Fyre Festival deployed a short video MVP and mysterious orange tile on Instagram to symbolize exclusivity and an enigmatic social experience (Hess, 2022). They orchestrated the simultaneous posting of their MVP by some of the world's most well-known social media influencers, symbolizing high status and social standing. Increasing symbolism further, the founders suggested the festival was to be held at Pablo Escobar's former private island and labeled the festival as "the greatest party of all time." The short video MVP focused heavily on symbolic representations of exclusivity, implying that the event would be a once-in-a-lifetime opportunity, leading some to pay up to $250,000 to secure tickets sight unseen (Kreps, 2017). MVPs with a high level of symbolic realism can induce a strong fear of missing out on a culturally significant

event (see Przybylski, Murayama, Dehaan, & Gladwell, 2013). The deployment of this MVP revealed a strong demand for the potential product, but the festival ultimately failed because there was a major disconnect between symbolic user perceptions generated by the MVP and the reality of what the company was able to eventually deliver (see Kreps, 2017). While this is an extreme example used to illustrate the symbolic dimension, another example of an MVP with high symbolic realism comes from Oculus Rift, creators of one of the first virtual reality headsets. The Oculus Rift MVP was not fully assembled (launched as a developer kit). Using crowdfunding, the Oculus Rift founder touted the MVP as the "closest we've come to Star Trek's Holodeck" to resonate with its target (techy) users and emphasize symbolic value (Kickstarter, 2012).

Scope: Boundaries of the MVP Construct and MVP Forms in Practice

We propose that MVPs fit between two conceptual thresholds: above the *testability threshold* and below the *exploitation threshold.* Passing the testability threshold requires that an entrepreneur construct a tangible manifestation of a concept for the purposes of external testing, thereby going beyond mere "thought experiments" (e.g., Folger & Turillo, 1999) or "disciplined imagination" (e.g., Shepherd & Sutcliffe, 2011). While thought experiments represent a useful cognitive exercise for entrepreneurs (Kier & McMullen, 2018; Shepherd & Gruber, 2021), they fall below the MVP testability threshold because they are neither concrete nor tangible. This testability threshold is the point at which an MVP becomes a tangible representation that is realistic enough to be shared with potential stakeholders so that they might provide feedback.

The exploitation threshold is the point at which an entrepreneur's project shifts from experimental and exploratory to a formalized commercial endeavor focused on execution, routines, and operational efficiency (March, 1991).[2] In other words, the exploitation threshold represents the point at which the artifact is considered to be a commerical product or service ready for scale rather than just a mechanism for testing the value of a proposed solution. The gap above the testability threshold and below the exploitation threshold gives rise to different MVP forms.

MVP forms. Within the boundaries we have specified, MVPs can take on several different forms. MVP forms are the physical or virtual manifestations that entrepreneurs use in practice (e.g., a landing page, a 3D mock-up, a pop-up demo), and they can be classified at different theoretical levels based on how potential users interact with the MVP (passively, dynamically, or via simulated experiences). Figure 1 illustrates MVP forms at each level.

Just above the testability threshold lies the *zone of passive interaction.* The most basic MVP form in this zone is the "napkin sketch." The founders of Southwest Airlines famously developed a napkin sketch of their airline concept that would transit between Dallas, Houston, and San Antonio. The sketch allowed the founders to describe and communicate the potential value of the concept in simple terms. However, napkin sketches are limited in their testability as they are essentially a rudimentary illustration of a potential solution. It is possible that an entrepreneur could still conduct relatively weak testing with a napkin sketch, although such actions might negatively impact the venture's legitimacy. Yet, the MVP in sketch form is still tangible as it can be shared and understood by others even though it is not a three-dimensional object.

In addition to the simple napkin sketch, there are several MVP forms that fall into the zone of passive interaction—where user testing is feasible but still largely a passive experience. The "explainer video" is an MVP form that is used to visually display a potential solution. An example comes from Dropbox cofounder Drew Houston. Houston developed an explainer-video MVP to test market interest in a potential product that could allow for

seamless file syncing across devices. Rather than first build the full product, which would require multifaceted integration across operating systems, management of large files over slow internet connections, and handling of file conflicts, Houston simply created a video that demonstrated the value of the potential software to gauge interest. The MVP, although nonfunctional, helped Houston ensure that people were interested in the product and resulted in a waiting list of 75,000 people for the beta product within days. Nonetheless, while viewing the explainer video, potential users could not actually interact with the MVP itself. Other MVP forms in the zone of passive interaction include the "wireframe diagram" and the "2D mock-up."

The next level up is the *zone of dynamic interaction*. In this zone, the "landing page" is a commonly used MVP form in practice. The landing page MVP is a basic webpage that displays a visual representation of a potential product or service. In some cases, the landing page is used to gather initial customer acquisition estimates or contact information from potential customers. A slightly more dynamic form of the landing page presents customers with a Buy Now button, which is used to compile preorders. Other forms in the zone of dynamic interaction include the "3D mock-up," the "clickable web/mobile app," the "email campaign," the "social media campaign," and the "crowdfunding campaign" (see Table 1 for examples).

Finally, the *zone of simulated experiences* includes additional MVP forms that are conceptually just below the exploitation threshold and focus on measuring user behavior. For example, the "Wizard of Oz" MVP is used to create a simulated customer experience using a combination of technology and manual workarounds. In a recent *New York Times* article, Eric Ries, the founder of the lean start-up movement, described a Wizard of Oz MVP used to test the potential for a new food-tracking app. Using this app, users "could take a photo of food and it would tell you how many calories were in it. [The entrepreneurs] said it was driven by proprietary technology. But they were really just using people hired to look at the images" and manually estimate the calories (Kessler, 2021: 2). Entrepreneurs who use the Wizard of Oz MVP attempt to put users in an immersive front-end experience without their comprehension of what is happening "behind the curtain," hence the name Wizard of Oz. If well designed, users might imagine that the technology that supports the product is fully functional, while it is simply a low functioning MVP mock up used to test the value of the potential solution. The "concierge" MVP is similar to the Wizard of Oz MVP. Continuing the preceding analogy, users have a view of what takes place "behind the curtain." With the concierge MVP, the back end, which often involves individuals providing manual services, remains visible and transparent to the user (Bland & Osterwalder, 2019). Entrepreneurs often rely on these two MVP forms when the full solution at scale requires extensive technical development. As such, an overreliance on manual processes that do not require an initial investment might be a necessary first step to test user experiences. Other MVP forms in the zone of simulated experiences include pop-up demos, tests and events (e.g., a food entrepreneur who uses a farmers market to test flavors and get feedback or an entrepreneur who sets up a pop up booth outside an event to display and get feedback on an MVP) and "semifunctional test objects" (e.g., Vesta Stoudt's duct tape MVP described previously).

In practice, it is common for entrepreneurs to combine MVP forms. For example, explainer videos can be displayed directly on landing pages, crowdfunding campaigns might display 2D mock-ups, the Wizard of Oz MVP might rely on a clickable app to facilitate interactions with users, and so on. Nonetheless, the identification and labeling of discrete MVP forms distinguishes between various MVPs used in practice at different levels, and this categorization also provides a conceptual foundation upon which the rest of our work (and future MVP research) can be built. Table 1 provides examples of various MVPs with details on their forms and dimensionality.

Figure 1
Minimum Viable Product (MVP) Forms Used in Practice

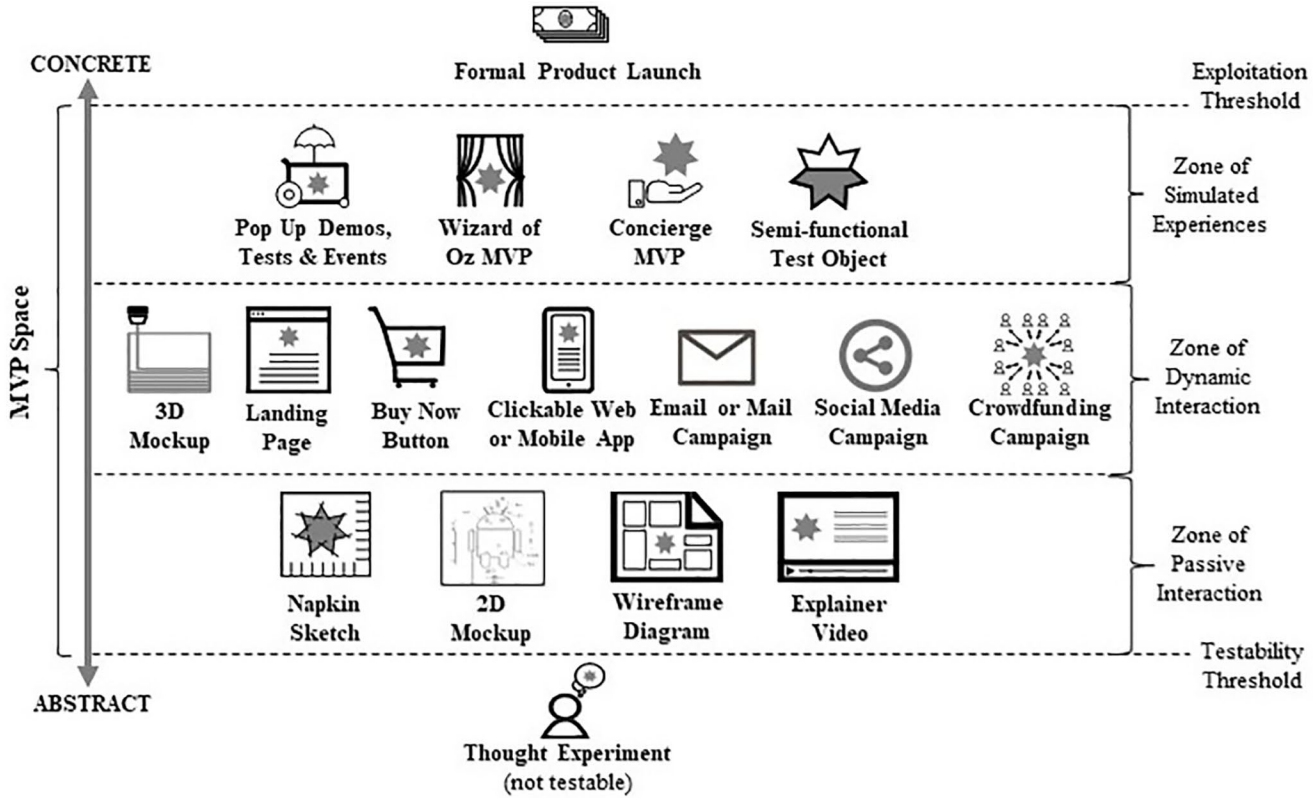


Table 1
Examples of MVP Theoretical Dimensions, Forms, and Deployment Tactics

Company (Year)	Brief MVP Description	Aesthetic Realism	Symbolic Realism	Functional Realism	MVP Form(s)	Deployment Tactics
Buffer (2010)	Buffer founder Joel Gascoigne wanted to test to see if social media managers would be interested in prescheduling Twitter posts. He deployed his MVP with no functioning software via a landing page. Users were directed to information about pricing and an email sign-up form. Gascoigne used this information to see if there was any market demand in order to gain insight on desired features.	Low	Medium	Low	Landing page	• Low transparency • High scope/sample
Clif Bar (1992)	Avid hiker Gary Erickson asked his mom for help with Clif's first MVP. As he describes, "She was like, 'What's an energy bar?' So, I had to explain it to her. It's kind of like that great oatmeal chocolate chip raisin cookie that you make but we can't use butter, we can't use sugar and we can't use oil. She goes, 'Well, that's impossible!' I said, 'Well, let's just try.'" (quoted in Fisher, Stevenson, Neubert, Burnell, & Kuratko, 2020). For the next 6 months Erickson brought over bags of ingredients to test recipes and finalize the company's first MVP. Erickson sampled the MVP with friends while on hikes and at local events.	Medium	Medium	Medium	Semifunctional test object	• High transparency • Low scope/sample
Dropbox (2007)	Dropbox cofounder Drew Houston developed an explainer video to convey to potential users how a seamless syncing system across devices might work. Given high technological constraints to build a functional version, Houston focused on aesthetics and symbolism first to test the market and amass a waiting list for the beta product. The MVP video used images of file folders and different devices to explain how the system could work. After the explainer video was deployed on *Hacker News*, the list grew to 75,000 within days, signaling high market demand for such a product.	Medium	Medium	Low	Explainer video	• Medium transparency • Medium scope/sample

(continued)

Table 1 (continued)

Company (Year)	Brief MVP Description	Aesthetic Realism	Symbolic Realism	Functional Realism	MVP Form(s)	Deployment Tactics
Duct tape (1943)	Duct tape was developed by Vesta Stoudt, a package worker in a plant that had a contract with the U.S. Navy to ship ammunition. The tape used in the plant was flimsy and often was destroyed during shipping. To solve this problem, she began tinkering around on her time off. She eventually developed a cloth-based waterproof tape, known today as Duct Tape. Because she envisioned her first customer as the U.S. Navy, Stoudt was focused on functionality over aesthetics or symbolism. When she struggled to get her supervisors to take her seriously, she sent a sample and wrote directly to President Roosevelt, who forwarded her letter to the war production board so it could begin product procurement.	Low	Low	High	Semifunctional test object	• High transparency • Low scope/sample
Fyre Festival (2017)	To suggest that the Fyre Festival would be an extremely exclusive luxury experience, the founders deployed a video MVP with an enigmatic orange tile on Instagram that featured symbolism and aesthetic features over functionality. The deployment of this MVP revealed a strong demand for the potential product, but the festival ultimately failed because there was a major disconnect between symbolic user perceptions generated by the MVP and the reality of what the company was able to eventually deliver. .	Medium	High	Low	Social media campaign and buy now button	• Low transparency • High scope/sample
Halo Top Ice Cream (2011)	Halo Top founder Justin Woolverton used a $20 tabletop Cuisinart machine to create his first low-calorie ice cream MVP. He used this MVP to test flavors with potential customers and convince a copacker to help him further refine and produce a sample batch. After several MVP iterations with the copacker, he presented four sample flavors to Erewhon Market in Southern California. Once it approved the product, he began hand delivering the ice cream with a cooler and his personal vehicle.	Low	High	Medium	Semifunctional test object	• High transparency • Low scope/sample

(continued)

Table 1 (continued)

Company (Year)	Brief MVP Description	Aesthetic Realism	Symbolic Realism	Functional Realism	MVP Form(s)	Deployment Tactics
MoviePass (2011)	In 2011, MoviePass launched a Buy Now MVP campaign in the San Francisco Bay Area proposing that with its pass consumers could attend one movie daily in theaters for a set monthly fee. The MVP test gained 19,000 subscribers but was accomplished without consent or partnership with theater owners. The MVP concept was based on a voucher pass system, although the vision was to build a fully enabled technology solution. After the MVP was validated, MoviePass struggled to develop partnerships and a viable business model for several years before going out of business.	Low	Medium	Medium	Buy Now button	• Low transparency • Medium scope/sample
Oculus Rift (2012)	In 2012, 20-year-old Palmer Luckey launched a Kickstarter campaign for his Oculus Rift concept. The campaign raised US$2.4 million, making it one of the most successful crowdfunding campaigns. Luckey engaged top developers and integrated existing virtual reality technology to provide a "developer kit" for backers. The campaign used high transparency, disclosing that the "consumer version of the Rift is still a ways down the road." The campaign also emphasized symbolic value of what the device could become that resonated with its potential users with statements such as "closest we've come to *Star Trek*'s Holodeck" and "step inside your favorite game." (Kickstarter, 2012) Two years later, Luckey sold Oculus to Facebook for US$2 billion.	Medium	High	Medium	Crowdfunding campaign and semifunctional test object	• High transparency • High scope/sample
Pebble Watch (2012)	Pebble founder Eric Migicovsky tested an MVP for a smartwatch in 2012 on Kickstarter. Initially seeking $100,000 that he would use to source suppliers, the campaign raised over $10 million with a partially functional MVP.	High	High	Medium	Crowdfunding campaign	• Low transparency • High scope/sample
Peloton (2013)	Peloton founder John Foley combined a highly visual Kickstarter campaign with a social media campaign, semifunctional test object, and wireframe when he unvieled his Peloton concept in 2013. The visuals demonstrated the sleek design of the equipment and sample wireframe screenshots conveyed how fitness data would be tracked and shared with virtual instructors in real-time. During the initial campaign 297 backers pledged $307,332. The company value exceeded $45 billion at its peak.	High	Medium	Medium	Crowdfunding campaign, social media campaign, semifunctional test object & wireframe.	• Medium transparency

(continued)

Table 1 (continued)

Company (Year)	Brief MVP Description	Aesthetic Realism	Symbolic Realism	Functional Realism	MVP Form(s)	Deployment Tactics
Segway (2000)	The Segway MVP was developed in secrecy by Dean Kamen. The MVP was unveiled only to close industry insiders and advisors. During the long MVP development stage, Kamen and his early investors became very attached to the original MVP vision. His investors included Jeff Bezos, Steve Jobs, and others.	High	High	High	Semifunctional test object	• Low transparency • Low scope/sample
Southwest Airlines (1967)	Cofounder of Southwest airlines and amateur pilot Rollin King famously developed a "napkin sketch" to communicate and gain interest for his idea for a new kind of airline system. To explain how the airline could create efficiencies and avoid interstate carrier regulations, King grabbed a cocktail napkin and sketched a simple triangle, positioning Dallas, Houston, and San Antonio at each corner. He then connected the dots, calling his makeshift route map the "Texas Triangle." Using his simple visual, he communicated the seeds of what would become a revolutionary business.	Low	Low	Low	Napkin sketch	• High transparency • Low scope/sample
Spanx Shapewear (2000)	Spanx founder Sara Blakely developed her first MVP in her apartment by cutting the feet off a pair of pantyhose and sewing together her innovative women's undergarment known as Spanx. She sold her first MVP to friends and acquaintances and then used it to convince a manufacturer to produce a limited run of commercial samples for her. Just over a decade later she was recognized as the youngest self-made female billionaire in history.	Low	Medium	High	Semifunctional test object	• Medium transparency • Medium scope/sample
Sparx Hockey (2016)	Sparx founder Russell Layton spent two years designing his MVP for an at home hockey skate sharpening machine. He unveiled the MVP via a Kickstarter campaign and a demo at a hockey tradeshow in 2016. Given the technical complexity of his innovation, Layton prioritized the functional aspects of the MVP before testing with users in a public forum. The crowdfunding campaign had a high level of transparency, providing backers with a detailed look at the engineering and development process. In 2019 Sparx was named to the Inc. 500 list of America's fastest growing companies.	Medium	High	High	Crowdfunding campaign and pop up demos and events	• High transparency • High scope/sample

(continued)

Table 1 (continued)

Company (Year)	Brief MVP Description	Aesthetic Realism	Symbolic Realism	Functional Realism	MVP Form(s)	Deployment Tactics
Tesla's Cybertruck (2019)	Using a landing page, Tesla unveiled a high-aesthetic and symbolic MVP for the first fully electric truck concept. Within 5 days of the MVP's deployment, Tesla had amassed more than 1.5 million preorders even though many details about the final product were still undisclosed. At the time of writing, the landing page and Buy Now button have been live for close to 4 years compiling preorders (the product has yet to ship in mass).	High	High	Low	Landing page, buy now button, and demo	• Medium transparency • High scope/sample
Theranos's Edison (2006)	The Edison was supposed to be able to use a simple pinprick drop of blood to diagnose over 300 potential illnesses. When conducting live demos with the MVP, Holmes would exhibit all the aesthetic and symbolic front-end steps, such as the blood draw and the placement of the sample in the Edison machine. Results would be presented as if they had been produced by the machine, even though the Edison was not functional (Schultz, 2020).	High	High	Low	Semifunctional test object	• Low transparency • High scope/sample
Twitter X (2006)	The original MVP for what would later become Twitter X was launched by the company Odeo for employee use. Users tested the MVP, which facilitated short-form messages between employees and reported back that it was an improvement for internal communications over email and text message.	Low	Low	High	Concierge MVP	• High transparency • Low scope/sample
Zappos (1999)	Company founder Nick Swinmurn uploaded pictures of shoes he did not own onto a landing page (originally www.shoesite.com) to test whether people would be comfortable buying shoes online. When a customer placed an order, he would drive around to find and purchase the shoes from a local retailer and then package and ship the shoes to the customer.	Medium	Low	Medium	Landing page and Wizard of Oz MVP	• Low transparency • High scope/sample

Note: It is important to note that minimum viable products (MVPs) are continually evolving, and as such, the MVP examples and representations in this article refer to a specific point in time during the MVPs' evolution (this usually corresponds to the most well-cited or most well-known examples for each venture). Additional examples, supplements and teaching notes related to this table are available at https://www.researchguides.org/mvp.

Extending Theory on MVPS: Risks and Mitigation

A baseline assumption of MVPs in prior literature is that they are constructive for early-stage entrepreneurial ventures (e.g., Camuffo et al., 2020). Practitioners often consider using MVPs as an essential and necessary part of entrepreneurship (Blank, 2012; Ries, 2011). Yet building and deploying an MVP is not without risks. Because entrepreneurs design MVPs with minimum features to facilitate efficient testing, they face risks and trade-off decisions when doing so. Next, we develop propositions highlighting specific types of risks related to MVPs and draw upon principles from the scientific experimentation literature to propose ways in which entrepreneurs could offset each risk. Figure 2 provides a visual representation of the conceptual scope of our entire model, including the MVP dimensions, forms, MVP risks/trade-offs, and theorized MVP risk mitigation tactics.

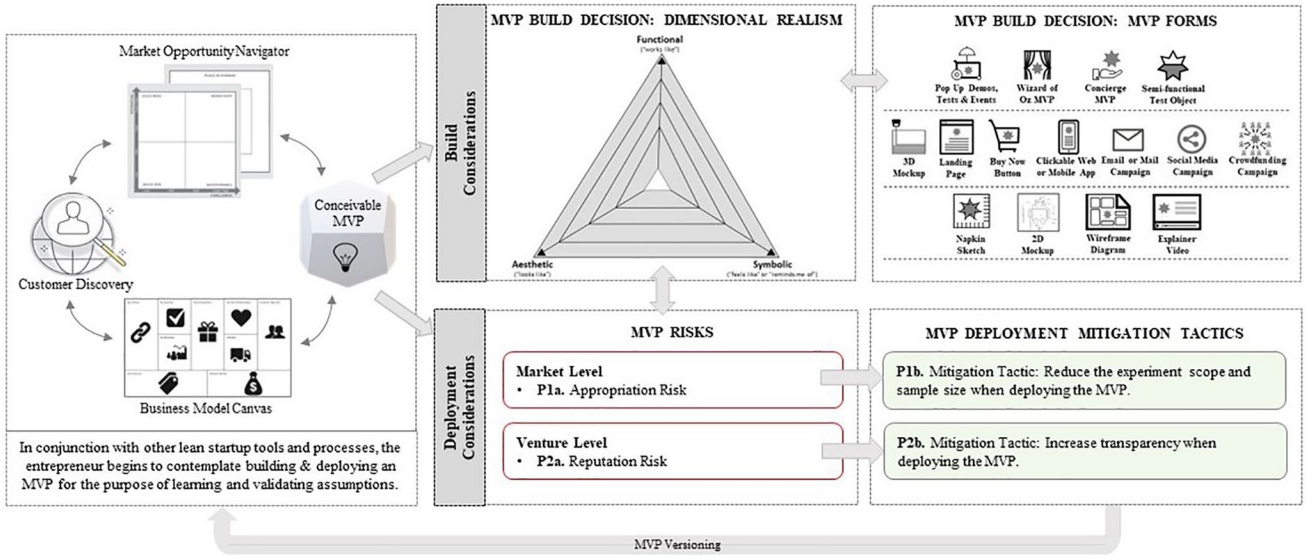
Market Level: Appropriation Risk

MVP realism decisions and appropriation risk. The competitive business landscape is a complex system (Simon, 1991) made up of many intricate parts that interact in nonsimple ways (Fleming & Sorenson, 2004; Nickerson & Zenger, 2004). Functioning and succeeding in these complex systems presents immense challenges for entrepreneurs. To enter such systems, entrepreneurs attempt to introduce novel, often unrecognizable products into the purview of an often unknown set of stakeholders (Fisher, Stevenson, Neubert, Burnell, & Kuratko, 2020). Public displays of new products or services by early movers can result in both opportunities and potential disadvantages (Dobrev & Gotsopoulos, 2010). Teece (1986) noted that initial innovators may not be in a position to capture the most value from their own technological innovations due to resource constraints and marketplace externalities. In particular, when product imitation is easy, the largest share of marketplace profits accrue after the introduction of a new innovation to incumbents that control complementary assets (Teece, 1986).

Given such threats, economic actors may closely guard the rare knowledge they possess about a market opportunity within the boundaries of the firm. Indeed, if economic actors are able to shield knowledge about certain rent-generating opportunities associated with a competitive imperfection, such actors are more likely to amass outsized economic rents (Alvarez & Barney, 2004; Barney, 1991). However, because entrepreneurial firms do not possess perfect information about their market opportunities (Knight, 1921), the lean start-up approach suggests that they can gain knowledge by interacting with stakeholders beyond the boundary of the venture (Burnell et al., 2023; Venkataraman, Sarasvathy, Dew, & Forster, 2012). Doing so means that entrepreneurs must unveil at least some aspects of their potential offering's feature set externally. This external disclosure could expose the venture to competitive information problems (Alvarez & Barney, 2004), including appropriation risk.

Given the desire for low-cost opportunity exploration, it is not uncommon for entrepreneurs to initially build and deploy MVPs that prioritize aesthetics over other dimensions. High-aesthetic MVPs help external stakeholders quickly sense what the final product or service could "look like." When such MVPs enter the public domain, other competitive firms or those that might be considering entering the product space may take notice. If the opportunity appears to have value, the simple act of deploying an MVP could expose a venture to appropriation risk. It is not certain that other firms will steal an MVP in its current form, but rather, they may be able to leverage their own resources to appropriate value from the market that the entrepreneur intends to service over the long term (Alvarez & Barney, 2004).

Figure 2
Conceptual Model of Minimum Viable Product (MVP) Build and Deployment Considerations



Prior research has documented that novice entrepreneurs commonly worry that their concepts might be stolen in the early stages of development (Drencheva, Stephan, Patterson, & Topakas, 2021). One way in which the entrepreneur can attempt to insulate their innovations from duplication is via patenting (i.e., establishing intellectual property [IP]). However, for patent protection to be effective, the entrepreneur would need to exhibit a version of the product that will be stable into the future. The ambiguous nature of an MVP means that establishing enforceable IP is likely to be infeasible at this stage. Moreover, given the cost-efficiency and iterative aims of MVPs and the broader lean start-up approach, which relies on rapid experimentation, establishing IP at the exploration stage directly conflicts with the lean goals of deploying an MVP.

Since establishing IP may be infeasible and incompatible with the purposes of an MVP, entrepreneurs who want to protect their solutions from potential imitators may need to signal to other firms that they have a superior advantage in terms of product functionality (often referred to as a first-mover advantage). When an entrepreneur increases the functional realism of an MVP, the immediate threat of product appropriation by a rival may be attenuated due to a decreased short-term economic incentive for that rival. However, increasing functional realism in the first versions of the MVP means that an entrepreneur would need to deviate from the core ethos of MVP testing, which is to minimize effort and cost by deploying low-realism MVPs as quickly as possible (Blank & Dorf, 2012). Therefore, the entrepreneur faces a trade-off decision: Should they deploy a "cheap and lean" low-functional-realism MVP to learn as fast as possible from the external market yet risk rapid imitation from competitors, or should they build a more comprehensive, higher-functioning version that would be more difficult to imitate before unveiling it beyond the boundary of the firm?

For a salient example, consider Tesla's unveiling of a high-aesthetic MVP in 2019 for the first fully electric truck concept, named Cybertruck. Within 5 days of the release of the MVP, Tesla had amassed more than 250,000 preorders (Rueters, 2019). During the MVP release, Tesla prioritized aesthetic features, such as its unique design, its steel structural skin, its vault utility bed, and images of its armored-glass windshield. Yet, during the live demonstration, one of the windows, which were supposed to be bulletproof, shattered, indicating that the MVP lacked functional aspects. However, Tesla's high-aesthetic MVP made a splash in the automotive world (Rueters, 2019), garnering major interest from consumers, and in the process signaled to incumbent firms that the electric truck market was ripe for entry. Within 18 months of demonstrating this high-aesthetic but low-functional-realism MVP, other firms, including Ford and GM, announced plans to develop electric trucks after years of reluctance to do so. Ford's competitive electric truck has since come to market, while Tesla's Cybertruck had not yet shipped commercially at the time of writing.

All else equal, one way to resolve this dilemma is to increase the functional aspects of the MVP through investments of time and capital (reducing the functional distance between the MVP and the anticipated final product). Such an approach would likely reduce the time lag between initial MVP deployment and commercial launch. However, from the lean start-up perspective, increasing functional realism of an MVP is not always feasible (or advisable) given the goals of testing ideas with minimal investment. New venture resource constraints also often limit how much investment can go into MVP development. In addition, precisely which resources to leverage or combine to reduce the functional distance between the MVP and the eventual commercial product cannot always be predicted ex ante. Given the pervasive resource constraints and knowledge problems facing new ventures, we contend that a nontrivial appropriation risk

manifests whenever MVPs are deployed into the public sphere. Moreover, when the functional realism of the MVP is low and barriers to entry are also low, the deployment of this artifact can result in rapid imitation from others. Prior research shows that incumbents routinely scan the entrepreneurial landscape to appropriate technology from underresourced firms (Dushnitsky, 2017; Dushnitsky & Lenox, 2005). Thus, while at odds with the efficiency aims of the MVP, we reason, as functional realism increases, the immediate threat of appropriation by rival firms declines. We formally express this with the following proposition:

> *Proposition 1a*: At the time of deployment, appropriation risk is inversely related to MVP functional realism and positively related to MVP aesthetic realism.

Mitigating appropriation risk through deployment sample and scope decisions. In the prior section, we explained why appropriation risk manifests when entrepreneurs deploy MVPs in the public domain. In this section, we draw on well-known principles from the literature on scientific experiments to theoretically account for partially mitigating appropriation risk. The success and generalizability of experiments, whether in the entrepreneurial or the scientific realm, depends on design elements of the experiment being conducted. The entrepreneur, much like a scientific experimentalist, must determine where and with whom to conduct experimental tests. Fundamentally, these are decisions related to the sample size (number of participants) and the scope (breadth of sample sources) that will be used in the experiment. *Sample size* is simply the total number of cases that the entrepreneur (or experimentalist) plans to assess in their experiment. *Scope* refers to the demographic, geographic, or psychographic dispersion of individuals involved in the experiment. For example, an entrepreneur could choose between experimenting via a public open call on the internet (wide scope) versus testing with a handful of family members (narrow scope). The entrepreneur might also consider using a convenience sample consisting of a cross-section of community members who visit a local coffee shop versus active sampling of potential early adopters at a specialty trade show. These illustrations demonstrate that the act of experimenting with an MVP requires a series of important ex ante choices by the entrepreneur.

In scientific terms, such decisions have implications for both statistical conclusion validity (Shadish, Cook, & Campbell, 2002) and generalizability (Highhouse, 2009). Sample size decisions impact statistical conclusion validity, such that with larger samples, the chances of uncovering a causal effect increases (decreasing the possibility of type II error; see Shadish et al., 2002). Increasing the scope has the potential to imply increased generalizability (Henrich, Heine, & Norenzayan, 2010). As Wilson, Aronson, and Carlsmith (2010: 50) explain,

> Most social psychologists would agree that the perfect study would be one that was conducted in a naturalistic setting, with a diverse sample of participants that revealed the nature and causes of an important social psychological phenomenon. Unfortunately, such a study is like a Platonic ideal that can rarely be achieved. Experimentation almost always involves a trade-off between competing goals: the desire to study a real problem in its natural context, on the one hand, and the desire to have enough control over the setting to be able to learn something about that problem.

As with scientific experiments, we assume that a larger scope in an MVP experiment would allow an entrepreneur to acquire increased generalizable evidence that there is a market need for the concept. For example, testing with a large sample and wide scope on a crowdfunding portal could achieve these ends given the typically large and dispersed nature of

crowdsourced groups on such platforms (Afuah & Tucci, 2012; Stevenson, Allen, & Wang, 2022). As an example, Pebble founder Eric Migicovsky tested an MVP for a smartwatch on the popular crowdfunding website Kickstarter in 2012. Initially seeking $100,000, the campaign ended up raising over $10 million without a built-out functional MVP. Migicovsky had conducted a large-sample (worldwide) experiment using a high-aesthetic and symbolic MVP. With this large sample, Migicovsky was able to learn rapidly, with a high degree of confidence, that the market was favorable to his novel smartwatch concept before building the product or even sourcing suppliers. However, deploying an MVP with this large scope and sample carries certain risks. The success of the campaign signaled to incumbent technology firms (e.g., Apple, Garmin) that users were keenly interested in smartwatch options, potentially increasing the interest of other technology companies in the product space. Despite the massive success of its initial testing with a high-aesthetic-realism MVP and its first-mover rollout, the Pebble watch has since been discontinued. Adding to this complication, some entrepreneurs might argue (as some experimentalists do; see Mook, 1983) that the goal of the MVP experiment ought not be to obtain fully generalizable knowledge, but rather the goal should be to obtain specific knowledge that pertains to a specific small set of individuals (referred to as the "population of interest" in the experimental literature and "early adopters" or "lead users" in the organizational and innovation literature).

Taken together, the logic just outlined suggests that entrepreneurs confront a trade-off associated with (a) where (the scope) and (b) how many individuals (the sample size) to test their MVPs. On one hand, entrepreneurs can gather robust and generalizable knowledge from testing with many potential users. On the other hand, entrepreneurs may also be increasing appropriation risk when they open their MVP up to a large audience. Hence, entrepreneurs must confront this experimental design trade-off when deciding how to best deploy their MVP. We propose the following:

> *Proposition 1b*: Reducing experimental scope and sample size when deploying MVPs will decrease appropriation risk; however, testing with a narrow scope or sample also reduces the depth of learning for entrepreneurs related to the validity and generalizability of their experimental results.

Venture Level: Reputation Risks

MVP realism decisions and reputation risk When new firms gain access to novel and valuable information from users and other stakeholders, they put themselves in a much stronger position to develop innovative new products and enter new markets (Fisher, 2019). Focusing on aesthetic or symbolic features of an MVP before building out functional aspects can be beneficial as it allows for more rapid learning about customer preferences and their willingness to pay. Moreover, this approach is also quite cost-effective as building functional features typically requires more extensive investments of both time and capital, relative to aesthetic aspects. Indeed, such practices are quite common in entrepreneurial accelerators and other high-tech start-up communities (Cohen, Bingham, & Hallen, 2019). For example, an informant in a recent study of entrepreneurs in accelerators articulated, "Building the fancy product would have taken a really long time, but fortunately, we learned it's not necessary" (Cohen et al., 2019: 17). This approach of early MVP deployment before attending to functionality concerns is common among entrepreneurs. However, this can also be hazardous.

While high-realism MVPs are effective for learning from markets, they also create expectations from those who interact with them. One primary goal of the MVP is to determine if potential users might be compelled to buy (Blank, 2013). Thus, an ideal MVP validation outcome occurs when the MVP elicits a strong visceral response. Blank (2009) refers to this idealized outcome as one in which the entrepreneur can observe the user's "pupils dilate" or a change in the user's voice. Such a response is especially likely when individuals interact with MVPs that have high symbolic and cultural resonance (Soublière & Lockwood, 2022). MVP symbolic realism relates to expectations and beliefs that users develop about the potential product's value. When users interact with MVPs that evoke strong cognitive representations of personal significance, user expectations and emotional connection toward eventual product releases may strengthen. Observing an elevated emotional connection is a desirable outcome for entrepreneurs when testing their MVPs. However, when MVP user expectations increase, there is increased potential for reputational fallout if the venture is unable to deliver a final product that meets the user's expectations. Therefore, the higher the symbolic realism, the greater the emotional and cultural resonance associated with the potential product and the greater the reputation risk if the final product falls short of the user's expectations.

A notable example related to the risks of deploying a low-functional but highly symbolic MVP comes from the defunct company Theranos. Its MVP, the Edison, was supposed to be able to use a simple pinprick drop of blood to diagnose over 300 potential illnesses. Theranos built the MVP with high aesthetic and symbolic realism but low functional realism. Even though the functional aspects were lacking, Theranos's founder, Elizabeth Holmes, would present the MVP to high-profile investors and potential users as though it were functional. When conducting live demonstrations using the MVP, Holmes would emphasize its symbolic value, explaining how a tiny blood draw could reduce the frictions of diagnostic testing with the potential to save lives. Holmes would take the person experiencing the MVP demonstration out of the room while they waited for the Edison to generate the results (Carreyrou, 2019). The blood sample would then be transferred to an off-the-shelf commercial diagnostic machine to generate the test results, which were later placed next to the Edison so they were viewable upon return to the room (Carreyrou, 2019). Tyler Schultz, a Theranos whistleblower, describes the situation: "We had no assets validated on the product on the Theranos system… so if we collected a sample from [users], as far as I know, zero tests would be run on the Theranos platform, [but users were] definitely under the impression that all of these tests were being run on the Theranos platform" (Schultz, 2020: chap. 2). This is an extreme example of a low-functional and high-symbolic Wizard of Oz MVP being used to deceive potential users. When it was later revealed the Edison was not functional, Holmes was charged with fraud.

When entrepreneurs deploy MVPs with low functional realism and high symbolic realism, there is an increased risk of reputational damage if the eventual product does not perform as depicted. Although prior literature suggests that initially testing with low-realism MVPs is a common and often necessary step for early-stage entrepreneurs (Shankar & Shepherd, 2019), we argue that when entrepreneurs showcase such MVPs, their reputational risks are amplified, especially when audiences strongly resonate with the symbolic features of the MVP. As a result, while symbolic realism can increase reputation risk, focusing on the functional aspects of the MVP during initial deployment may offset this risk. When users

interact with MVPs that are functionally closer to the final product form, the venture reduces the gap between the representative artifacts used for testing and the final product. We thus propose the following:

> *Proposition 2a*: At the time of deployment, reputation risk is inversely related to MVP functional realism and positively related to MVP symbolic realism.

Mitigating reputation risk through transparency. One way in which entrepreneurs can reduce reputation risk is via increased transparency. By transparency, we mean open and free sharing of product-related information about the MVP at the time of deployment. Indeed, prior research shows that transparency has the potential to benefit an organization's employees, customers, and other stakeholders via trust as a mechanism (Parris, Dapko, Arnold, & Arnold, 2016). According to Mayer, Davis, and Schoorman (1995), trust, in part, is based on the perception that the entity to be trusted adheres to a set of principles that the trustor finds acceptable. Other research shows that when established firms take an active transparent stance, they can develop a competitive advantage as potential customers exhibit increased brand favorability and have greater purchase intentions (Eggert & Helm, 2003). Likewise, similar transparency benefits emerge for entrepreneurial ventures when deploying MVPs. Open disclosures related to the true status of an MVP will reduce the potential reputational or legal risks that an entrepreneur could face in the short or long term because users will have more insight into and understanding of the status of the product or service. Eric Reis recently discussed how a lack of transparency in the context of MVPs can create moral and legal hazards for entrepreneurs:

> You see how people get confused really easily, because it is important to be able to do a landing page test where you ask people to pre-order a product that doesn't exist. But . . . you have to come clean about what you're doing and why. Otherwise, your customers might come to rely on something you said or a promise that you can't deliver that would harm them. And that's not only morally wrong, it's bad business to build that reputation. (quoted in Kessler, 2021: 2)

Entrepreneurial funding and support platforms advocate for increasing transparency when testing with MVPs. In 2019, Kickstarter issued new transparency guidelines directing entrepreneurs to increase honesty, openness, and candor related the status of the MVPs they present on the portal (Kickstarter, 2019). Kickstarter claims this benefits both funders and entrepreneurs. Meg Heim, Kickstarter's head of systems integrity, stated the disclosures "help guide creators into setting expectations that [will] help them [and the campaign] in the long run" (Heater, 2019: 2).

Although these arguments and examples indicate increasing transparency during MVP testing could alleviate reputational risk, it is also possible that it might reduce learning efficacy during experimentation. Some scientific experimentation literature implies that when full details about an experiment being conducted are known by the participants, there is an increased risk of demand characteristics biasing the experimental results (cf. Hertwig & Ortmann, 2008; Nichols & Maner, 2008). *Demand characteristics* refers to "cues that make participants aware of what the experimenter expects to find or how participants are expected to behave" (Nichols & Maner, 2008: 151). Demand characteristics

introduce bias into scientific experiments as participants tend to act in ways that support an experimenter's hypotheses (Orne, 1962). Hence, while transparency may reduce reputational risk for an entrepreneur, it could also interfere with valid inferences derived from MVP experiments.

Indeed, it is possible for firms to conduct experiments with MVPs with added transparency, yet just as is the case with scientific experimentation, some level of opaqueness may increase the practicality of the design and the quality of the data obtained (Hertwig & Ortmann, 2008; Kelman, 1967). Thus, when experimenting with MVPs, entrepreneurs face a trade-off wherein increasing transparency has the potential to decrease reputation and legal risks but doing so might reduce experimental realism. This, in essence, is an internal validity problem (Patel & Fiet, 2010) that may reduce entrepreneurs' ability to rapidly learn from MVP deployment. Hence, we propose the following:

Proposition 2b: Increased transparency when deploying MVPs can decrease reputation risk; however, increased transparency might diminish the authenticity of feedback received during experimentation from participants.

Discussion

By drawing from the literature on the lean start-up, we develop a definition and conceptual model for one of the primary lean start-up tools: the MVP. Our conceptual model unpacks the dimensionality of MVPs, identifies MVP forms, and explains when and why using MVPs might involve inherent risks. We present propositions based on scientific experimentation principles to account for how such risks could be mitigated.

Implications and Future Research Opportunities

MVP dimensionality and configurational approaches. We conceptualized MVPs as consisting of three interconnected realism dimensions: aesthetic, functional, and symbolic. We discussed the dimensions of MVP realism separately when laying out our conceptual foundations, yet we recognize that these dimensions are not orthogonal to one another. The dimensions of MVP realism are likely correlated with each other, at least to some degree. For example, one could imagine that aesthetic features of an MVP could also include elements of symbolic realism. The design choices made by Thomas Edison in commercializing the electric light, for instance, included aesthetic features that fit within institutional norms for existing light sources (cf. Hargadon & Douglas, 2001), and hence one could argue that aesthetic and symbolic realism were related to one another in this case. Likewise, aesthetic features could serve the "functional" purpose of providing the user an aesthetic experience, or symbolic features could provide some utility to users, thereby also offering some functionality. This assumed nonorthogonality could have implications for substitution or complementarity among the dimensions. For example, entrepreneurs could use high-aesthetic realism as a substitute for functionality if these two dimensions are expected to be related in the final product form. Assuming certain features take less time and resources to construct than others, one dimension of realism might serve as a lower-cost substitute for other dimensions when experimenting.

We encourage future research to build upon the three-dimensional conceptualization of MVPs that we present herein. Researchers could directly apply this three-dimensional framework to empirical questions related to design attributes and adoption (cf. Rindova & Petkova, 2007). Future studies could also take a three-dimensional scaling view of MVPs and explore how the correlations between each of the dimensions impact different venture stakeholders. For example, are certain three-dimensional configurations especially harmful (or helpful) to social judgments in certain contexts or for certain types of venture audiences (cf. Fisher, Kuratko, Bloodgood, & Hornsby, 2017)? This future research opportunity is particularly applicable when considering the social constructivist (e.g., Baker & Nelson, 2005) or entrepreneurial narratives (e.g., Fisher, Neubert, & Burnell, 2021; Uparna & Bingham, 2022) perspectives. The social construction of ideas requires entrepreneurs to communicate meaning to audiences who may have no prior familiarity with the product or domain. Thus, researchers could explore how entrepreneurs might focus on certain MVP dimensions when testing with discrete stakeholder groups with different expectations and preferences. Alternatively, researchers might explore how entrepreneurs alter their emphasis on MVP dimensions with different stakeholder groups, perhaps as an another way to mitigate appropriation or reputation risk.

MVP design trade-offs and risk outcomes. Our theorizing highlights that a core trade-off for entrepreneurs related to whether to increase functionality to mitigate risks that are connected to aesthetic and symbolic realism. An implication of this trade-off is that entrepreneurs who emphasize a fast and frugal approach to experimenting with MVPs with limited functionality may increase exposure to appropriation and reputational risks. This implication highlights a risk associated with applying the lean start-up framework. Our theorizing suggests entrepreneurs may sometimes need to build more functionality into their MVPs to reduce such risks. Thus, our conceptual insights provide more nuance and some caution to the lean start-up framework.

Another trade-off relates to the sample size, scope, and transparency of MVP experiments. Borrowing from the literature on scientific experiments, we theorized that these factors present trade-offs for entrepreneurs as they consider with whom to experiment and how much information should be provided about the MVP. Our propositions suggest that entrepreneurs attempt to optimize learning when they test MVPs with a large and diverse sample of potential customers with MVP transparency set based on the scope of the MVP test. However, such decisions may also be associated with increased reputational costs, leading to a trade-off. An implication of this trade-off is that entrepreneurs following strict scientific methods of experimentation may sometimes put themselves in jeopardy of appropriation and reputational risks. This implication questions whether "entrepreneurs as scientists" is always an appropriate analogy. Perhaps scientific methodologies, while useful in evaluating opportunities (cf. Camuffo et al., 2020), may sometimes lead to unforeseen hazards. Thus, what we propose here adds to the emerging literature on entrepreneurs as scientists by shifting the focus from evaluating opportunities to considering long-term risks of using scientific methods when testing the value of potential solutions within markets.

Beyond market- and venture-level factors impacting MVP usage, future research might consider individual-level factors that could influence MVP design and deployment decisions. For example, future research could explore what happens when an entrepreneur becomes personally attached to their MVP. Indeed, we know that when individuals actively spend time

developing ideas into tangible artifacts, a sense of psychological ownership over those artifacts can develop (Grimes, 2018; Norton, Mochon, & Ariely, 2012; Ranganathan, 2018; Zhu, Hsu, Burmeister-Lamp, & Fan, 2018). Researchers might therefore consider whether and how entrepreneurs prioritize realism features based on their own sense of attachment to their ideas. For example, do highly attached entrepreneurs prioritize realism features across all dimensions, or do they tend to fixate on one area of realism? Do highly attached entrepreneurs hold back certain features of their MVPs in secrecy to avoid negative feedback? Researchers might also explore how an entrepreneur with high psychological ownership over certain features may shift (or not shift) the MVP dimensions that are emphasized and the implications of such shifts in terms of appropriation, reputational risks, and learning.

Beyond psychological attachment, there are several other individual-level factors that could influence MVP build and deployment decisions. These include personality (Zhao, Seibert, & Lumpkin, 2010), vision (Venus, Johnson, Zhang, Wang, & Lanaj, 2019), entrepreneurial identity (Stevenson, Guarana, Lee, Conder, Arvate, & Bonani, 2024), learning differences (Wiklund, Yu, Tucker, & Marino, 2017), regulatory focus (Wallace, Little, Hill, & Ridge, 2010), coachability (Ciuchta, Letwin, Stevenson, McMahon, & Huvaj, 2018), or differences in personal wealth (Bruton, Pryor, & Cerecedo Lopez, 2024). Researchers might consider how such individual-level factors influence MVP trade-off decisions related to appropriation or reputation risks discussed herein.

Finally, additional research opportunities related to MVP design trade-offs exist at the team level. For example, a venture team might disagree on which features to include in their MVP. Understanding how teams come to consensus on MVP forms, features, and dimensions presents an interesting research opportunity. Team conflict related to MVP features could reduce the team's willingness to engage in experimentation, or it could increase team willingness to experiment.

Implications for lean start-up tool alignment research. The MVP is only one tool within the suite of lean start-up tools. While each lean start-up tool is valuable, aligning tools together in practice is likely to provide synergistic learning. For example, consider how the Market Opportunity Navigator (Gruber & Tal, 2017) and the MVP can be used synergistically. High environmental uncertainty and unpredictability as it relates to what to do first during initial stages of start-up progression can deter entrepreneurial entry. Focusing on an MVP and aligning it with the Market Opportunity Navigator might lessen this initial hurdle. The Market Opportunity Navigator first guides entrepreneurs through a generative process, resulting in a portfolio of market options. When these options are illuminated, the next step of testing ideas within a specific market can be systematically determined. Once entrepreneurs generate market options, an MVP can help navigate customer discovery activities within opportunity sets. During the opportunity navigation process, trying to understand unmet market needs and the reasons that might compel customers to buy proposed solutions is critical (Gruber & Tal, 2017). Entrepreneurs can benefit from combining the Market Opportunity Navigator with quickly developed low-realism MVPs at this early stage of validation. This synergistic combination could reveal initial insights into how valuable opportunities within a particular market might be by uncovering the reasons or concerns that underlie hypothetical purchasing decisions. Aligning and synergistically utilizing lean start-up tools can thereby enhance and expand entrepreneurs' search and validation efforts.

Moreover, failure to align an initial MVP with a workable market opportunity could result in unproductive or unusable testing data. Inferior data acquired as a result of poor tool alignment might hinder decisions related to subsequent MVP development (e.g., relying on MVP forms or realism levels that do not align with the market). Inferior data derived during the MVP testing stage might also hinder critical go-to-market decisions (Wilden, Chirico, & Detienne, 2022). Future research could consider how testing with aligned versus misaligned lean start-up tools can influence important start-up decisions, such as the go versus no-go decision (e.g., Bakker & Shepherd, 2017). Moreover, researchers might consider how these decisions influence the venture over time. For example, researchers could investigate if subsequent pivots (or venture failure) are more likely to occur over time if lean start-up tool misalignment occurred during the exploration stage. Future research might also consider which of the lean start-up tools carry the most weight when it comes to pivot-or-persistence decisions. Overall, there are rich future research opportunities to explore the connection between lean start-up tools as well as the impact of contingency factors.

Practical Implications

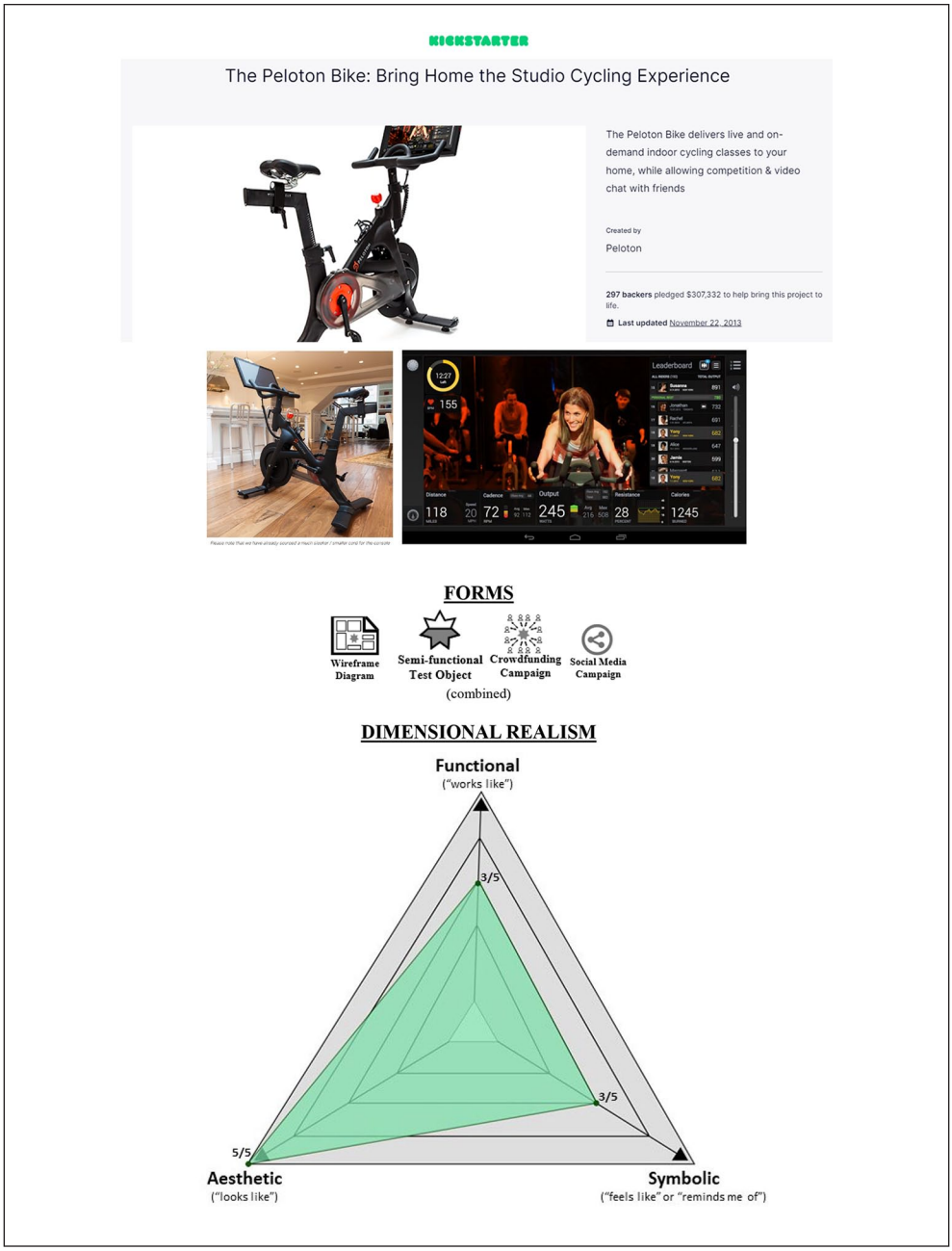
Herein, we bridge the divide between science and practice by critically evaluating MVP development and deployment. Specifically, we provide cautions to entrepreneurs who seek to use MVPs. Although MVPs can result in efficient learning, they might also lead to negative social judgments if the trade-offs inherent in MVP deployment decisions are overlooked. In practice, entrepreneurs may mitigate potential risks of MVPs by reducing experimental scope and sample size, increasing transparency, aligning MVPs with other lean start-up tools, or reconfiguring the dimensions of aesthetic, functional, or symbolic realism. Experimenting entrepreneurs looking to successfully navigate MVP deployment trade-offs might learn from the body of work that documents effective scientific experimentation practices (e.g., Chen, Elfenbein, Posen, & Wang, 2024; Grégoire, Binder, & Rauch, 2019; Shadish et al., 2002; Stevenson, Josefy, McMullen, & Shepherd, 2020). Although learning via experimentation is the central purpose behind using an MVP, entrepreneurs can also leverage MVPs to achieve additional outcomes, such as collecting preorders (e.g., Tesla's Cybertruck) or amassing users for a two-sided marketplace. Finally, entrepreneurs should consider their learning needs when determining how to configure an MVP most effectively in terms of form combinations and along the realism dimensions presented herein.[3]

Conclusion

Scholarly interest in MVPs is emerging as researchers look to keep pace with entrepreneurship practice. Yet, the theoretical foundations for MVPs, including their inherent risks, were notably absent from the literature. We address this gap by presenting an integrative definition of MVPs and distinguishing the theoretical dimensions underpinning MVP realism. We also delineate the boundaries of the MVP and classify discrete forms of MVPs used in practice. We then develop propositions that explore intrinsic risks of MVP deployment and mitigation tactics to avoid such risks. Overall, we build a theoretical grounding for the MVP as it relates to features, trade-offs, risks, and risk mitigation. Given the emerging scholarly interest in MVPs, we also propose future research opportunities. We hope our conceptual presentation of MVPs will inspire additional theory building and empirical testing around this important tool used by entrepreneurs.

Appendix

Images of Peloton's Minimum Viable Product From the 2013 Crowdfunding Campaign



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Notes

1. It is important to note that minimum viable products (MVPs) are continually evolving, and as such, the MVP examples and representations in this article refer to a specific point in time during the MVPs' evolution (this usually corresponds to the most well-cited or most well-known examples for each venture).
2. March's (1991) seminal work specified two organizational modes: exploration and exploitation. Exploration involves search, variation, flexibility, discovery, experimentation, and the pursuit of new knowledge; whereas exploitation is focused on production, efficiency, and implementation (Levinthal & March, 1993). The exploitation threshold is the point at which an artifact deployed by the firm no longer fits the definition of an MVP as defined herein, even though additional learning is still likely to occur.
3. Additional MVP examples, practical supplements, and teaching notes are available at https://www.researchguides.org/mvp

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Contextualizing Lean Startup and Alternative Approaches for New Venture Creation: Introducing the Special Issue

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The Lean Startup movement fundamentally changed entrepreneurial education and the way new ventures evolve. While Steve Blank and other founders of the movement embraced academic ideas, the movement grew among practitioners largely disconnected from academic entrepreneurship research. The purposes of this special issue are (1) to better connect Lean Startup practice to academic entrepreneurship research and (2) to advance theory regarding Lean Startup practices and their outcomes. After a brief and personal story of Lean Startup's beginnings by its founder, Steve Blank, the first set of papers in this special issue juxtapose Lean Startup with alternative approaches to new venture creation developed by scholars outside the influence of the Lean Startup movement. The second set of papers describe how Lean Startup might be contextualized for different unique situations. The third set dives into different Lean Startup practices to help researchers and practitioners think more deeply about decisions and trade-offs made during implementation of Lean Startup.

Keywords: *entrepreneurship; new venture strategy; entrepreneurial action; lean startup*

Authors order is reverse alphabetical. All authors contributed equally to this paper and to the development of the special issue.

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Lean Startup is arguably the most widely used toolset adopted by practicing entrepreneurs and innovators. While there have been some empirical tests of its efficacy (e.g., Camuffo, Cordova, Gambardella, & Spina, 2020; Leatherbee & Katila, 2020), its development by practitioners has left it largely outside academic conversations about how entrepreneurs identify and/or create opportunities (Shepherd & Gruber, 2021) and what normative actions raise entrepreneurs' odds of creating successful new ventures. The purpose of this special issue is to bring Lean Startup more fully into the academic conversation regarding how entrepreneurs do and should (optimally) identify and/or create opportunities and build new ventures. We begin with a short personal essay by Steve Blank (2024) describing his personal experiences as the person most credited with initiating the Lean Startup movement. We hope you enjoy his personalized account of how it all got started and the thinking behind it.

The next paper in the special issue anchors the entire Special Issue. In "The Lean Startup as an Actionable Theory of Entrepreneurship," Eckhardt and Blank (2024) provide what we believe is the only description of Lean Startup by its founder in a research-focused academic outlet. They describe Lean Startup as a normative theory, lay out its core assumptions, and describe the Lean Startup process. Eckhardt and Blank note that while Lean Startup is a normative theory, it is "quasi-scientific" in that it begins with a theory of the business model that can be broken down into a series of hypotheses and tested to reduce uncertainty regarding the proposed business model's viability. They then describe points of commonality with several important conversations in entrepreneurship and innovation research, including the ION, creation theory, effectuation, bricolage, organizational learning, and corporate innovation.

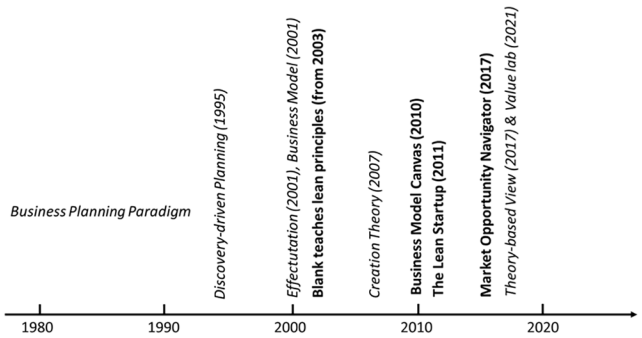
Using the article by Eckhardt and Blank as a foundation, we invited several prominent authors to respond, either by describing how their own work challenges or is challenged by the Lean Startup framework, by explaining how the framework might be adapted to an important new context, or by offering a deep dive into particular elements of the Lean Startup (e.g., the business model, minimum viable product [MVP]). We summarize the resulting papers below.

Before summarizing the invited special issue papers, however, we feel that it is important to offer a brief historical timeline describing the evolution of key concepts and ideas within Lean Startup. The reason is that as we worked with authors to develop their submissions, we were surprised to learn that there were divergent views regarding exactly what is included in Lean Startup and when/how it evolved. Perhaps this should not have come as a surprise given that, despite its foundations in academic research, Lean Startup and its core tools were developed for practitioners largely outside academic research journals in management and entrepreneurship. The Eckhardt and Blank paper summarizes the Lean Startup's core processes and assumptions, which should help alleviate some misconceptions. However, we thought it important to provide a historical timeline of Lean Startup to prevent "new wine in old bottles" syndrome wherein new authors claim long-developed insights as "new" because those insights were developed outside (prominent) research journals.

Timeline of Key Concepts

Today, the Lean Startup toolset is taught in numerous educational programs around the world such as CornellTech, New York University, and the University of Central Florida in the United States, the Universities of Bern and Katowice in Europe, the University of Delhi in India, the University of Sydney in Australia, and in many other schools and organizations

Figure 1
Timeline: The Lean Startup and Various Concepts in the Special Issue



Note. In bold: Lean Startup Tools; in italics: concepts discussed in the Special Issue.

that support entrepreneurship. The toolset also has become mainstream among startup founders and in the practice of entrepreneurial management (Contigiani & Levinthal, 2019).

In no small part, Lean Startup's success among practitioners arose from the toolset's emphasis on rapid and inexpensive learning and the notion of product-market fit, which enables users to quickly identify the core feature that allows new ventures to survive and prosper—that is, the ability to generate sustainable revenues from customers. This focus correspondingly addresses the major reason startups typically fail (a lack of market demand; see, for instance, El-Amine & Mohammed, 2023), echoing Drucker's (1954) early observation that: "management has failed if it fails to produce economic results. It has failed if it does not supply goods and services desired by the consumer at a price the consumer is willing to pay" (p. 7).

Lean Startup offers a methodology that is focused on continuous, iterative learning, and experimentation supported by a set of business tools designed to guide entrepreneurs during this journey. As Blank (2013) points out, his ideas were inspired in important ways by academic research and, particularly, by scholars such as Ian MacMillan, Rita McGrath, Henry Chesbrough, and Eric von Hippel. For instance, as an antidote to traditional business planning, McGrath and MacMillan (1995) offered an approach to planning that they labelled "discovery-driven planning" and, later on, "discovery-driven growth" (see McGrath, 2024 in this issue). They argued that due to the uncertainty inherent in new venture creation, planning processes that are of value for established businesses are not useful for innovative new ventures because so many shaky assumptions must be made about, for example, which product/service configurations are most attractive, and how much demand will emerge. Rather, managers and entrepreneurs should document, test, and revisit their assumptions in a disciplined learning process to convert assumptions into reliable facts.

To pinpoint the intellectual development of the concepts advanced by several of the authors in this Special Issue vis-à-vis the Lean Startup toolset, we provide a timeline in Figure 1. As one can see, the field of entrepreneurship has gradually moved away from the traditional business planning paradigm of the 1990s (e.g., Gumpert, 2002; Rich & Gumpert, 1985). The earliest approach discussed in this Special Issue is McGrath's and MacMillan's

(1995) discovery-driven planning, followed by Sarasvathy's (2001) effectuation theory, Amit and Zott's (2001) work on business models, creation theory by Alvarez and Barney (2007), and Felin and Zenger's (2017) theory-based view/value lab (Felin, Gambardella, & Zenger, 2021). As we discuss next, the development of the Lean Startup toolset unfolded in several key steps, spanning the period from 2003 to 2017.

Key Steps in the Development of the Lean Startup Toolset

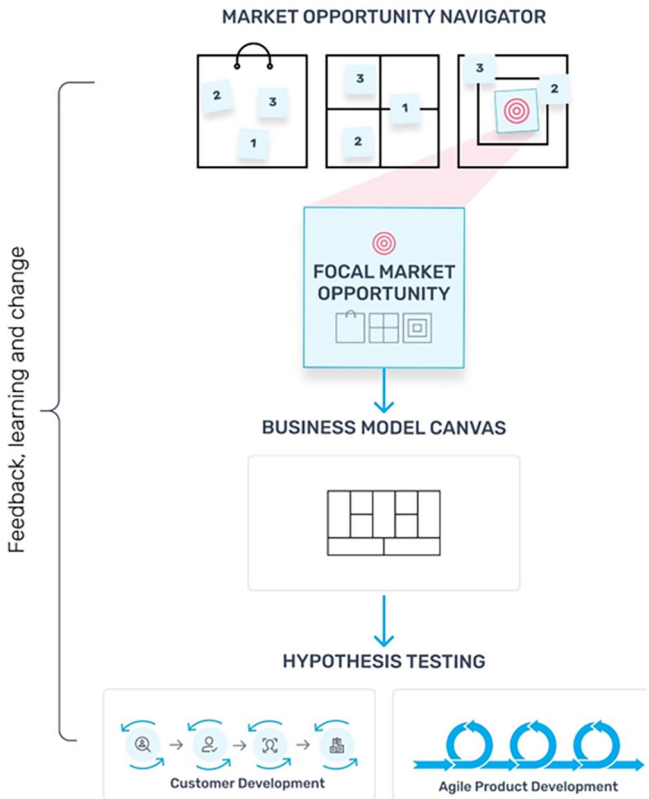
The development of the Lean Startup toolset went through several stages. It originated when Steve Blank, a Silicon Valley-based investor, serial entrepreneur, and educator, observed that many startups fail because they focus solely on perfecting a product without validating its appeal to customers or its revenue-generating potential. In his classes, Blank advocated for an outward-looking learning approach in new venture creation. Instead of writing a lengthy business plan, he asked entrepreneurs to formulate hypotheses about their start-up's key elements, test these hypotheses by engaging with customers and other stakeholders, and iteratively refine their concepts until discovering a repeatable business model that enables sustained value generation. To facilitate these search, learning, and validation activities, entrepreneurs can engage in customer development and agile engineering activities (i.e., develop their MVP). Blank shared his ideas in his 2003 book, *The Four Steps to the Epiphany* (Blank, 2003, 2013).

A few years later, Steve Blank added Osterwalder and Pigneur's (2010) Business Model Canvas to his toolkit because it allows entrepreneurs to broaden the scope of learning beyond customer-value assessment to the venture's overall profitability and viability. The Business Model Canvas originated in research conducted by Osterwalder (2004) for his dissertation and was turned into a business tool with the help of his advisor, Yves Pigneur. The Canvas outlines nine elements and relationships that define a new venture's business logic, including key elements such as the value proposition offered to customers, the venture's capabilities and resources, and its network of partners for creating, marketing, and delivering value to generate sustainable revenue streams (Osterwalder, Pigneur, & Tucci, 2005).

The Lean Startup toolset further evolved and gained widespread appeal with the work of Eric Ries, a student of Steve Blank, who saw parallels between Blank's approach and the lean manufacturing principles of the Toyota Production System. Ries coined the term "Lean Startup" for this approach and popularized it in his namesake 2011 publication. He introduced the Build-Measure-Learn feedback loop as a steering mechanism, enabling constant adjustments and informing decisions on whether to pivot (i.e., change the business model) or persevere with one's choices.

Most recently, Steve Blank adopted the Market Opportunity Navigator by Gruber and Tal (2017) as the 4th tool in the Lean Startup toolset. According to Blank (2019), the Lean Startup tools discussed above (Customer Development, MVP, Business Model Canvas) address product/market fit, business model viability, and pivoting (i.e., the "how to play" question) but lack guidance on where to initiate or focus the search for a new business (i.e., the "where to play" question). The Market Opportunity Navigator serves as a front-end tool for identifying, evaluating, and choosing potential market domains where an innovation or set of starting resources might be leveraged in designing a business model or testing minimal viable products. The Navigator helps entrepreneurs choose the most promising market domains before engaging in lean experimentation, drawing insights from various empirical studies on market choice in

Figure 2
The Lean Startup Framework



startups (Blank, 2019; Gruber, 2010; McGrath & MacMillan, 2000; 2009; Gruber, MacMillan, & Thompson, 2008, 2012, 2013; for a summary see: Gruber & Tal, 2024).

Figure 2 provides an overview of the four tools in the Lean Startup framework and shows how they work in concert to support entrepreneurs and innovators: the Market Opportunity Navigator helps in focusing on a promising market domain, which then serves as the reference point for developing a compelling business model with the Business Model Canvas. As many elements of the business model are based on assumptions, entrepreneurs should then test their business model assumptions by converting them into hypotheses and engaging in various experimentation and learning activities, including customer development and agile product development (e.g., MVPs) processes. Depending on what they learn, they may decide to pivot their market focus or change other elements in their business model.

Special Issue Papers

The Special Issue papers developed in response to Eckhardt and Blank (2024) can be divided into three clear groups. Three papers offer alternatives to Lean Startup and draw

direct comparisons between Lean Startup and the authors' preferred alternative. After presenting these three papers, we offer a short conclusion paper that (1) juxtaposes the four approaches (i.e., Lean Startup and the three alternatives), (2) offers some thoughts on how they might be reconciled, and (3) provides some direction for future research. We then continue the Special Issue with three other papers that contextualize and extend Lean Startup by offering thoughts on how it might be adapted to different settings, specifically poverty, social enterprises, and corporate venturing. The final two papers take deep dives into specific aspects of Lean Startup: the business model and the minimum viable product (MVP).

Direct Challenges to Lean Startup

In "Lean Hypotheses and Effectual Commitments: An Integrative Framework Delineating the Methods of Science and Entrepreneurship," Saras Sarasvathy (2024) provides the first of three papers that directly challenge Lean Startup. She carefully spells out differences between effectuation and Lean Startup using a modification of Wiltbank, Dew, Read, and Sarasvathy's (2006) Prediction-Control framework. She places Lean Startup in the "low control, high prediction" box of the 2×2 matrix, while placing her favored approach, effectuation, in the "high control, low prediction" box. While not as prediction-focused as the long-standard practice of writing business plans, by developing a theory of the business (that is, a business model) and conducting tests to validate the theory, Lean Startup requires making predictions and testing their efficacy. Effectuation, in contrast, involves taking action, without making predictions, with whoever wants to work with you (crazy quilt) based on what you can control (bird-in-hand) and afford to lose (affordable loss), embracing surprises with stakeholders (pilot the plane) and working to turn obstacles into opportunities (lemonade). A key difference is that whereas Lean Startup promises to help find a path toward profitability (if one exists), effectuation does not. Instead, repeated acts of effectuation increase the chances that something will eventually work, but not the probability that any one effort will succeed.

In "The Creation Theory of Entrepreneurial Opportunities and The Lean Startup," Sharon Alvarez, Jay Barney, Asli Arikan, and Ilgaz Arikan contrast creation theory with Lean Startup. Closely related to effectuation, we suspect that Sarasvathy would place creation theory in the "low control, low prediction" box (see Figure 2 in Sarasvathy's [2024] article in this issue). More of a descriptive theory than Lean Startup or effectuation, creation theory starts with the assumption that entrepreneurial opportunities are endogenously created by entrepreneurs under Knightian uncertainty, where the idea of constructing a theory or testing hypotheses is nonsensical. Under Knightian uncertainty, there is not enough information to construct predictions about what might work and no way to collect reliable data for testing them. Instead, actors engage in "conversational experiments" wherein they begin to articulate possibilities through conversation. Based on evolutionary theory (e.g., Nelson & Winter, 1982), most of these conversations are selected out, but a few are retained and discussed further by entrepreneurs and their stakeholders. Indeed, as these conversational experiments solidify and Knightian uncertainty eases, Lean Startup and other predictive approaches become increasingly viable. To contrast creation theory with Lean Startup (and its intellectual cousin, the ION), Alvarez and colleagues divide entrepreneurship theories developed in the last 25 years into two "families," termed Type One and Type Two. Type One theories, such as creation theory and effectuation, assume socially constructed opportunities by

individuals whose actions form opportunities. Type Two theories, such as Lean Startup, ION, and the theory-based view (discussed below), assume that opportunities exist objectively, independent of individual action, waiting to be discovered by unusually alert individuals. These two ways of thinking about entrepreneurship theory are fundamentally different at their core. Alvarez and colleagues argue that these two types of theories focus on different stages of the entrepreneurial process and apply under different boundary conditions, making them potential complements rather than substitutes.

Teppo Felin, Alfonso Gambardella, Elena Novelli, and Todd Zenger clarify and defend the theory-based view in "A Scientific Method for Startups: Comparing Lean and the Theory-Based View." Based on their description, we place the theory-based view in the "high control, high prediction" quadrant of Sarasvathy's modified Prediction-Control framework (see Figure 2 in Sarasvathy's article in this issue). Their paper attempts to describe how the theory-based view, as developed in their prior work (e.g., Felin & Zenger, 2017), differs from Lean Startup—an important task given that many scholars, including ourselves, could not previously see such differences (e.g., Zott and Amit [2024] cite theory-based authors Camuffo et al. [2020] as an example of Lean Startup). Both theories are normative, begin with a theory of the business, and involve practice-oriented application of scientific methods to data collection and analysis. However, Felin and colleagues (2024 in this issue) argue that the nature of the articulated theory is different, as are the order of activities and the purpose for which data are collected and used (e.g., hypothesis testing in Lean Startup vs. solution validation in the theory-based view). Although Felin and colleagues recognize similarities between the approaches and acknowledge merits of Lean Startup, their paper is very much an advocacy paper asserting the superiority of the theory-based view over Lean Startup.

Juxtaposing these papers' alternative descriptions of new venture creation with Eckhard and Blank's (2024) description of Lean Startup, one might conclude that they are all describing different phenomena—a classic case of the proverbial blind men and the elephant. We therefore inserted our own thoughts into the Special Issue by following these four contributions with a short paper of our own. Our first purpose was to juxtapose the four approaches (i.e., Lean Startup, effectuation, creation theory, and the theory-based view) so that readers could easily grasp their similarities and points of contrast. In doing so, we hope to present a more balanced view that is free from mischaracterizations that sometimes appear as authors advocate for their approach. For example, in making a case for the theory-based view as distinct from and superior to Lean Startup, Felin and colleagues (2024 in this issue), downplay the role of theory at the core of Lean Startup and sidestep the encompassing nature of Lean Startup's Business Model Canvas. They also interpret empirical tests that do not distinguish between Lean Startup and the theory-based view as supporting the latter (e.g., Camuffo et al., 2020; Camuffo, Gambardella, Messinese, Novelli, Paolucci, & Spina, 2021). Our second purpose was to point out ways the approaches can be reconciled as complementary and offer some thoughts about the conditions under which an entrepreneur might benefit more from adopting one approach over another (see also Alvarez, Barney, Arikan, & Arikan, 2024 in this issue). Our final purpose in this short paper was to offer some suggestions for moving forward toward additional reconciliation and greater understanding of which approaches work best in different situations.

Contextualizing Lean Startup

Three other papers in the Special Issue take Lean Startup and describe how it might be adapted in contexts where it is not ordinarily applied. In "Lean Start-up in the Setting of Impoverishment: The Implications of the Context for Theory," Garry Bruton, Christopher Pryor, and Jose Cerecedo Lopez (2024) observe that, historically, management theory and practice has emerged from scholars working in the mature economic settings of North America and Europe, which can result in theory and practice that does not adequately address the challenges businesses and entrepreneurs face in dramatically different non-Western settings. Bruton and colleagues address this issue with respect to the Lean Startup, which was developed primarily based on the experiences of high-tech entrepreneurs in the West. Their analysis indicates that impoverished, non-Western entrepreneurs need to alter certain Lean Startup practices to be more practical and effective under the institutional and resource-constrained conditions they face. For instance, in bottom-of-the-pyramid economies, entrepreneurs might rely more heavily on observing other market vendors and conducting tests vicariously, focusing on incremental business model opportunities/innovations within their local markets, thus overcoming constraints on their ability to access information. Entrepreneurs who face institutional barriers (e.g., gendered social norms) might utilize kinship networks to practice validated learning. Entrepreneurs who face severe resource constraints might employ bricolage to develop MVPs and place greater importance on generating revenue (not just information) when using MVPs. Entrepreneurs might also diversify their households' revenue-generating activities, and persevering/pivoting may take the form of reallocating resources from one activity to another to preserve prior investments of scarce resources.

A second contextualization paper in the special issue describes how Lean Startup might be adapted to help entrepreneurs develop new ventures that focus on addressing grand societal challenges. In their paper "Fueling Innovation for Positive Societal Change: The Lean Impact Startup Framework," Sophie Bacq and Stephanie Wang (2024) propose a Lean Impact Startup framework that encompasses a wide spectrum of economic, social, and environmental outcomes. Their framework combines the foundational principles of the Lean Startup methodology with fresh insights derived from contemporary perspectives on stakeholder theory and governance. Specifically, they delineate a three-step process: value search, value creation, and value distribution, and they use this conceptualization to offer practical, results-driven, and impact-centric strategies for organizations seeking to address today's complex societal challenges. They highlight several mechanisms that can empower organizations to proactively foster collaboration among multiple stakeholders, enabling them to address persistent systemic challenges that often require sustained and coordinated efforts.

The third paper written by Rita McGrath is entitled "Who Learns Fastest, Wins: Discovery-Driven Growth and the Lean Startup." It contextualizes the Lean Startup framework by putting the spotlight on the world of internal corporate ventures. McGrath recounts the origins of the discovery-driven growth concept she and Ian MacMillan developed in the 1990s based on their observations of corporate ventures. Because the discovery-driven growth methodology is one of the frameworks that inspired Steve Blank in his development of the Lean Startup, there are several similarities between both methodologies. Most importantly, they both emphasize learning activities in (corporate) venturing, given that there are few facts that innovators can rely on when seeking to advance novel projects. McGrath concludes by carving out points of difference between both methodologies and suggesting questions for future research.

Enhancing Lean Startup

The final two papers in the Special Issue focus on specific tools within the suite of Lean Startup tools (see Figure 2), describing their roots in academic research and how they can be better integrated, leveraged, and enriched as part of the Lean Startup process. In "Business Models and Lean Startup," Christoph Zott and Raphael Amit focus on the intersection between the Lean Startup framework and business model research. Their paper builds on the argument that the Lean Startup's suite of tools contains one clearly specified business model framework (the Business Model Canvas by Osterwalder and Pigneur [2010]), whereas extant business model research is more varied and thus can enrich the Lean Startup's perspective on business models. The paper goes on to identify parallels and principles common between research on business models and the Lean Startup. It also discusses how business models can be built in lean ways (i.e., the Minimum Viable Business Model). Zott and Amit then offer ideas on how the Lean Startup could benefit from a more holistic view on value propositions and by incorporating a contingency approach.

The other paper that zeros in on one aspect of the suite of Lean Startup tools is "The Minimum Viable Product (MVP): Theory and Practice" by Regan Stevenson, Devin Burnell, and Greg Fisher (2024). They focus on the concept of the MVP, which they define as "a tangible product or service representation with a limited number of features deployed for the purpose of learning about the value of a potential solution via experimentation." They distinguish MVPs from prototypes and describe the core dimensions across which MVPs vary—that is, aesthetics, functionality, and symbolism—and key tradeoffs that entrepreneurs make along these dimensions. For example, Stevenson and colleagues argue that a MVP that is aesthetically pleasing but low in functionality increases the probability that the entrepreneur's ideas will be appropriated by a competitor, but some of these risks can be mitigated by conducting experiments using a small sample observed by fewer people. Regan and colleagues conclude by describing ways researchers might leverage choices entrepreneurs make about MVP dimensions and their trade-offs to build more robust knowledge about this tool and how it fits within the larger Lean Startup suite of tools.

Conclusion

Over the past 2 decades, the ideas around and tools within the Lean Startup framework have proven their practical value. They have also begun to inspire scholarship to examine how existing theories can be mapped onto or relate to the Lean Startup (Contigiani & Levinthal, 2019) and how to bridge the academic–practitioner divide (Shepherd & Gruber, 2021) by addressing new research questions inspired by Lean Startup. The articles contained in this Special Issue advance this agenda by offering the most comprehensive academic analysis thus far of Lean Startup.

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Business Models and Lean Startup

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We explore the intersection between the lean startup methodology and research on business models. We note that both perspectives are anchored on a systematic approach to needs discovery and highlight the importance of value creation (vs. value appropriation). However, while the lean startup is centered on creating value for customers through discovery of product-market fit, research on business models concerns value creation for all stakeholders through establishing product-market-business model fit. We also discuss how the lean startup method informs research on business models and vice versa. We observe that the promise of applying lean startup to business models lies in probing the viability of new business models with an efficient and effective process. We find that business model research, in turn, can contribute to the lean startup methodology by (a) suggesting extensions to the method that derive from the holistic, system-level nature of the business model construct and (b) highlighting a range of specific experimental subprocesses, refinements, and tools that could be applied to refine the customer needs discovery process.

Keywords: *business model; lean startup; value creation; stakeholders*

Introduction

Blank and Eckhardt (2023) provide a comprehensive review of the lean startup methodology that was developed by Blank (2003) and Ries (2011). This practitioner-oriented method, which can be viewed as the application of rigorous scientific methods to entrepreneurship, is centered on discovering customers' needs and enhancing product-market fit through frequent iterations of product prototypes.

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The Blank and Eckhardt (2023) paper positions lean startup as a theory of entrepreneurial innovation and connects the lean startup process to opportunity-centric theories of entrepreneurship, to theories of organizational learning, and to theories of innovation such as bricolage and effectuation. The authors also point to the importance of incorporating lean startup concepts into academic research on business models. In this paper, we build on this observation and seek to highlight the potentially fruitful intersection between the lean startup methodology and research on business models. Past research concerning this intersection may have been limited by the fact that most lean startup-led works take the (very practical) business model canvas (Osterwalder & Pigneur, 2010) as their sole conceptual framework for business models, whereas business model researchers have gone beyond the canvas to develop a more rigorous scholarly perspective and a rich and variegated conceptual toolkit to address the business model phenomenon (e.g., Amit & Zott, 2021; Foss & Saebi, 2017; Massa, Tucci, & Afuah, 2017; Snihur & Markman, 2023; Zott, Amit, & Massa, 2011). These different research foci have left the intersection between lean startup and the business model somewhat under-researched and under-developed.

To address this limitation, we examine how the lean startup method can inform research on business model design and implementation and how research on business models, in turn, can inform the lean startup method. We observe that the promise of applying lean startup to business models lies in probing and ascertaining the viability of new business models through an efficient, structured, and effective process. Further, we find that business model research can contribute to lean startup by (a) suggesting expansions to the method that derive from the holistic, system-level nature of the business model construct and (b) highlighting a range of specific experimental subprocesses, refinements, and tools that could be applied to improve the needs discovery process.

We begin with a review of the business model construct and proceed with an examination of how the lean startup methodology can, in turn, inform research on business models. We then switch lenses to examine how business model research can inform the lean startup method. We conclude by pointing out research opportunities at the intersection between the lean startup and business model perspectives for theory and practice.

Theory

Business Models

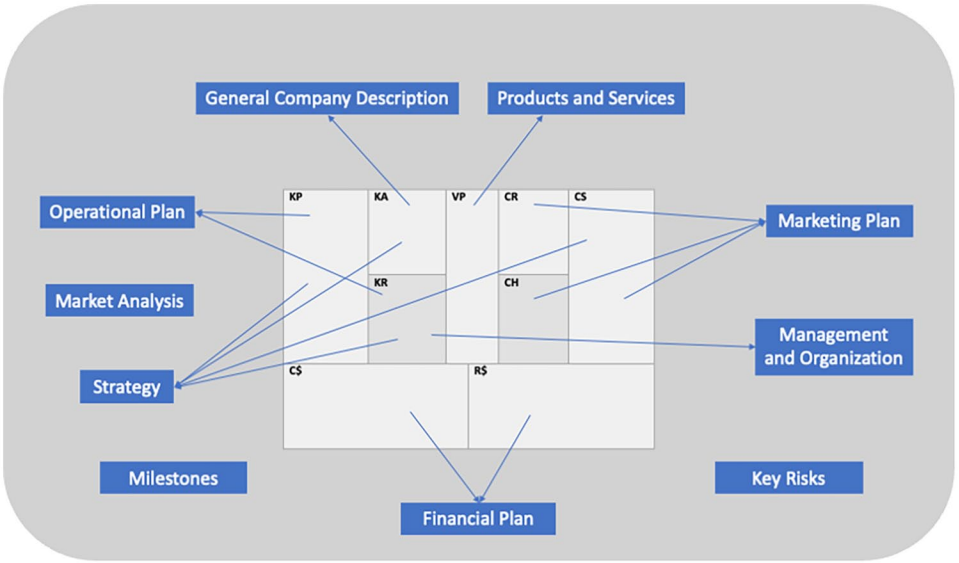
The business model is a core strategic choice that general managers and entrepreneurs (and those who support and invest in them) need to consider (Amit & Zott, 2021). It addresses the question: How should the firm do business (Amit & Zott, 2001)? A business model can be conceived of as a boundary-spanning activity system that is centered on perceived customer needs and enabled by a focal firm. The business model encompasses activities performed by the focal firm's partners, suppliers, and customers in the pursuit of value creation and capture (Amit, Han, & Zott, 2019; Freudenreich, Lüdeke-Freund, & Schaltegger, 2020; Zott & Amit, 2010). More formally, Amit and Zott (2021: 13) define the business model as "*the system of interdependent activities that are performed by a focal firm and by its partners and the mechanisms that link these activities to each other*. An activity in a focal firm's business model can be viewed as *the engagement of human, physical, and/or capital resources of any party to the business model (the focal firm, end customers, vendors, etc.) to serve a*

specific purpose toward the fulfillment of the overall objective." Business model innovation refers to the introduction of a novel system of interdependent activities in the product market space in which the focal firm competes (Amit & Zott, 2012; Chesbrough, 2010; Snihur & Zott, 2020). As Leppänen, George, and Alexy (2023) point out, novel business model designs can contribute to high firm performance in combination with configurations that feature other value drivers such as efficiency, lock-in, and complementarity (Amit & Zott 2001).

Business model design and innovation are profoundly entrepreneurial tasks, as they center on opportunity creation, development, and exploitation (Amit & Zott, 2001). At the same time, they are of high strategic importance (Snihur, Zott, & Amit, 2021). The antecedents of strategic business model design frame the design process (Amit & Zott, 2016; Peprah, Giachetti, Larsen, & Rajwani, 2021). New and innovative business model designs can explain why and how new entrants disrupt incumbents and, in turn, offer a way for these same incumbents to invigorate their firms and mitigate the effects of disruption (Kim & Min, 2015). Advanced information technologies—such as 5G, mobility, artificial intelligence, the internet of things, cloud computing, and blockchain—offer a wide range of innovative ways for entrepreneurial leaders in new as well as established firms to conceive of, design, implement, and manage novel and transformative business models with new activities and ways of connecting, governing, and/or monetizing activities (Eggers & Park, 2018; Hacklin, Björkdahl, & Wallin, 2018). By purposefully designing their firm's system of boundary-spanning exchanges and activities and utilizing digital technologies, entrepreneurial leaders can create a purposeful system of interdependent activities—namely, their business models (Zott & Amit, 2009). The business model is an important lever for enhancing the focal firm's "ecological fitness"—that is, for improving its fit within a continuously shifting technological and product-market environment and for creating a competitive advantage (Amit & Zott, 2016; Helfat et al., 2007).

Business model thinking has clearly influenced the lean startup movement. As part of its methodology, the lean startup has incorporated a specific analytical tool that uses the terminology of business models—namely, the *business model canvas* (in short, canvas) (Osterwalder & Pigneur, 2010). The canvas is a visual representation of the core components of a business idea (Leatherbee & Katila, 2020) and can be put on a poster to help translate the business model idea into a full-fledged business plan. The canvas contains nine fields, each representing one of the following concepts: key activities (KA), key resources (KR), key partners (KP), value propositions (VP), customer relationships (CR), channels (CH), customer segments (CS), cost structure (C$), and revenue streams (R$). These concepts, taken together, depict the essence of how an organization as a whole—that is, through its activities, products, services, and strategic choices—creates, delivers, and captures value. Most of the fields of the canvas fit well with Amit and Zott's (2021) definition of the business model as an activity system, notably key activities (KA), key partners, and customers (KP & CS). These canvas elements refer to the content (i.e., *what* activities are performed within the business model—KA) and governance (i.e., *who* performs them—KP & CS) of the activity system (Zott & Amit, 2010), respectively. In addition, the canvas fields value proposition (VP), cost structure (C$), and revenue streams (R$) articulate the system's value logic (i.e., *why* it makes sense from a value creation and capture perspective; see Amit & Zott, 2021). Finally, the canvas fields channels (CH) and customer relationship (CR) fields relate to the structure of the business model (i.e., *how* its activities are linked to each other, and *how* the focal firm interacts with its partners, suppliers, and customers; see Zott & Amit, 2010).

Figure 1
How Business Model Canvas Fields Map Onto Business Plan



Source. Based on Exhibit 9.3 in Amit and Zott (2021).

The canvas is thus consistent with Amit and Zott's (2021) *What, How, Who, and Why* (i.e., content, structure, governance, and value logic) conceptualization of the business model but goes beyond it. Indeed, it broadly represents much of what needs to go into a business plan: general company description, products and services, marketing plan, operational plan, management and organization, and strategy and financial plan. Figure 1 shows how the canvas fields map onto these essential building blocks of a business plan. It is not surprising, therefore, that thinking through and applying the canvas "is the perfect basis for writing a strong business plan" (Osterwalder & Pigneur, 2010: 268). The canvas can be used as a tool for taking a business (model) idea and converting it into a business plan and, from there, into a new venture (Amit & Zott, 2021; Leatherbee & Katila, 2020). A logical conceptual action sequence for entrepreneurs would be to first conceive of a core business model (activity system) that addresses an important customer need; then flesh out the idea by filling in the nine fields of the canvas (i.e., KA, KR, KP, VP, CR, CH, CS, R$, C$); and, finally, to craft and implement a business plan for the new business venture that also includes market analysis, milestones, key risks, and organization. The lean startup implementation methodology can be applied at every stage of this conceptual sequence. Next, we will review that methodology briefly before exploring the common ground between business models and lean startup.

Lean Startup

Lean startup (see Blank & Eckhardt, 2023) draws from ideas on organizational learning, real options, product development, and technology evolution (Contigiani & Levinthal, 2019).

It is a "blend of . . . 'learning-by-doing' approaches, particularly drawing from experimentation" (Leatherbee & Katila, 2020: 574) and builds on design thinking (Brown, 2009; Rindova & Martins, 2021; Simon, 1996), bricolage (Baker & Nelson, 2005), discovery-driven planning (McGrath & MacMillan, 2000), and effectuation (Sarasvathy, 2001). The central ideas behind lean startup—specifically, the systematic identification and testing of key hypotheses underlying a venture—have paved the way toward viewing entrepreneurs as disciplined explorers (Aulet, 2013; Gruber & Tal, 2017), theorists (Wuebker, Zenger, & Felin, 2023), and pragmatic scientists (Zellweger & Zenger, 2023).

Lean startup is anchored on the premise that entrepreneurs' initial perception of a business opportunity is subjective and may differ greatly from a validated one. The notion of "lean" refers to the method's focus on avoiding unnecessary resources and waste and points to the roots of the concept in the lean manufacturing movement, with its emphasis on streamlined production systems (Womack & Jones, 1997; Womack, Jones, & Roos, 1990). The lean startup approach took further inspiration from agile software development to cut waste even beyond the typical capital efficiency and frugality of entrepreneurs. The goal of lean startup is to rapidly develop product-market fit and thereby shorten the time to product development (Blank, 2013; Ries, 2011, 2017).

Although primarily aimed at startup firms, the lean startup method has also been suggested for use in established firms to build corporate ventures (e.g., Ries, 2017). Recent extensions also include the insightful *Market Opportunity Navigator* framework (Gruber & Tal, 2017), a set of practical tools designed to help entrepreneurs identify and evaluate market opportunities. It represents an extension of the lean startup method in that it helps entrepreneurs identify a viable starting point ("where to play")—that is, market opportunity for the lean startup process.[1] Building on this framework, Shepherd and Gruber (2021) describe the five main building blocks of the lean startup framework, including business model, validated learning/customer development, minimum viable product, perseverance vs. pivoting, and market opportunity navigation.

The lean startup method asks entrepreneurs to articulate important assumptions related to the opportunity, formulate empirically testable hypotheses about these, and then test the hypotheses systematically by conducting deliberate experiments (mainly interviews) with early customers. The results of these early market tests allow for a revision of the assumptions, the exposure of hidden premises, and the chance to update the entrepreneur's beliefs about the opportunity (Ehrig & Schmidt, 2022). Such systematic probing-based learning will be enhanced when entrepreneurs use specific guiding questions, such as "What new evidence do we have about the validity of our assumptions? What assumptions need revision? What new assumptions need to be made?" (McGrath & MacMillan, 2000: 245).

The usefulness of probing and, especially, the importance of "getting out of the building" and talking to customers has been confirmed by empirical research (Leatherbee & Katila, 2020), which has found, surprisingly, that entrepreneurs who formulate more hypotheses subsequently probe fewer of them. Contigiani and Levinthal (2019) point out related costs and risks of lean startup, such as (1) cost of experimentation (e.g., for training key personnel in the use of the scientific method), especially in the later stages of product or business model development; (2) disclosure and leakage of strategically important information while performing market-based tests and soliciting feedback on minimum viable product and business models; (3) reputational damage when experiments are perceived negatively by third parties; (4) noisy

signals from tests instead of clear and unequivocal learning insights; and finally (5) cost of organizational change if lean startup suggests change to an existing concept—both financial costs as well as indirect costs in terms of employees' motivation, time, and attention.[2]

On the positive side, applying lean startup reduces market risk; the constant feedback from business model stakeholders during the development process ensures that one does not build a business (model) in a vacuum—that is, one that customers do not want, or one for which stakeholders find little value in participating. Lean startup is furthermore likely to reduce CAPX and initial funding needs. Through its emphasis on cheap probing (mainly via interviews), lean startup encourages delaying CAPX until these costs cannot be avoided any further.

Given that the lean startup method is relatively young, empirical evidence about its effectiveness is still scant. However, as mentioned previously, the early evidence is promising. In one study (Camuffo, Cordova, & Gambardella, 2020), early-stage venture teams were all asked and trained to follow key elements of the lean startup method such as business model canvas, customer interviews, minimum viable product, and customer-product interactions with the help of prototypes. One set of teams received additional training in the scientific method: identifying the problem, articulating theories, defining clear hypotheses, conducting rigorous tests to prove or disprove them, measuring the results of the tests, and drawing appropriate conclusions from them to inform decision-making. The study showed that the scientifically trained teams performed better and pivoted more often than the control group teams.

A scientific approach helps entrepreneurs better understand their current situation, as well as identify new possibilities and hypotheses. Leatherbee and Katila (2020) found that increased probing leads to the discovery of new opportunities and results in the convergence on an idea (and not in an endless loop of hypothesis formulation, probing, and testing). This suggests that the lean startup method is likely to aid in the development of value-creating business models, especially when conducted in a scientific fashion.

The findings also suggest that boundary conditions of lean startup are important and require attention; lean startup is unlikely to be a "one-size-fits-all" solution. One boundary condition is the composition and educational background of the startup team. Team members who have received a formal business education (e.g., who went through an MBA program) are less likely to engage in probing (i.e., leaving the building and talking to customers). However, once they begin doing this, they are more likely to formulate new business ideas, identify new hypotheses to test, and converge faster on a final business concept (Leatherbee & Katila, 2020).

Another boundary condition, as mentioned previously, is the training of the team in the application of the scientific method (Camuffo et al., 2020). A third boundary condition seems to be whether the context is an independent startup or a corporate venture. Although lean startup seems intuitive (Ries, 2017), anecdotal evidence suggests that method is not as straightforward to apply in larger and older firms because its core requirements (e.g., acknowledging and testing assumptions, seeking external feedback, approaching customers with less-than-perfect prototypes, etc.) often clash with established company processes, managers' mindsets, and firm culture. This suggests firm size and age as possible contingency factors.

A fourth boundary condition that could be particularly relevant for the application of lean startup to the development of new business models is the degree of market uncertainty—for example, whether the market in which the new business model is deployed is nascent (i.e., highly uncertain) or more established. A nascent market is a new and uncertain market that

lacks established standards and is in a dynamic state of flux (Santos & Eisenhardt, 2009). Developing and implementing innovative business models in nascent markets (McDonald & Eisenhardt, 2020) is associated with a particularly high degree of uncertainty (where part of the uncertainty derives from the novelty of the business model and part of it stems from the nascent market), and this may require certain adaptations to the lean startup approach, as further explained later. We elaborate on this idea below.

Lean Business Model Design Processes

Common ground between lean startup and business model research. Lean startup and research on business models have much in common. First, both literatures emphasize the importance of value creation. A key objective of the lean startup process is to enable product-market fit—namely, by helping entrepreneurs develop a product or service that meets a clear market need and thereby creates value for customers. The business model perspective also centers on the idea of value creation while considering all stakeholders and the value that is created for each stakeholder by the business model (Amit & Zott, 2001; Zott & Amit, 2008).

Second, both approaches advocate taking a holistic view and considering the business as a system made up of many interlocking elements that are all important for value creation. In the lean startup perspective, the canvas (Osterwalder, 2004) is the tool used to incorporate a holistic view into the analyses, while in research on business model design and innovation (e.g., Zott & Amit, 2010) the business model is conceptualized as a system of interdependent activities aimed at value creation, delivery, and appropriation. Empirical research has emphasized the usefulness of this view by showing that entrepreneurs' capacity for complex system-level thinking is indeed an important antecedent of business model innovation (Snihur & Zott, 2020).

A third parallel between lean startup and business model research is their explicit acknowledgment of the necessity for a systematic process of opportunity development. Both approaches anchor the development of a new venture and/or business model on needs discovery. In doing so, both approaches also broadly favor a systematic and methodological approach (e.g., see Amit & Zott, 2021, Chapters 5-7). They posit that investing significantly in new capabilities, and scaling the organization, should come after the stakeholder needs and corresponding activities that will form the core business model are clarified (Amit & Zott, 2021, Chapter 4; Blank & Eckhardt, 2023; Tidhar & Eisenhardt, 2021).

A fourth parallel, research on firm strategy, has historically been firm-centric; company managers often profess that they pay a great deal of attention to their customers when, in reality, they often have trouble doing so. In contrast, business model research, through its integrated, holistic, and balanced consideration of value creation and value capture, suggests a central place for customers in strategic management and entrepreneurship frameworks and analyses (Demil, Lecocq, Ricart, & Zott, 2015). Business model innovation rarely originates in technological novelty, but starts with the question, "What customer need will the new business model address?" (Amit & Zott, 2012: 45). This customer-centric view suggests important connections with marketing and design and highlights the need to better understand the micro-foundations of business model design (e.g., the cognitive processes and mechanisms that enable it) (Shepherd, Seyb, & George, 2023). In a similar vein, lean startup emphasizes customer discovery, customer validation, and customer creation (see again Figure 1 in Blank

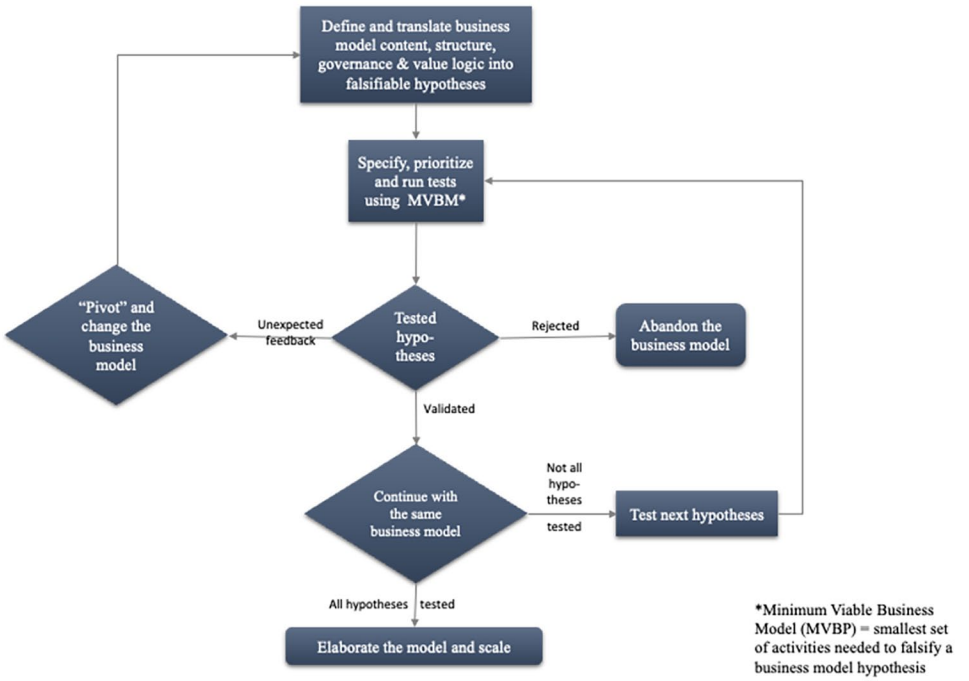
& Eckhardt, 2023). These aspects of the lean startup methodology are extremely relevant in both research and practice.

Building business models in lean ways. Based on these parallels and common principles, there is an emerging literature that leverages the substantial common ground to link the two approaches explicitly by suggesting that lean startup (or similar processes embodying important lean startup principles) be used for building a new business model. In an early contribution to that literature, Sosna, Trevinyo-Rodriguez, and Velamuri (2010) emphasize the importance of experimentation and trial-and-error learning for the introduction and subsequent rapid growth of Naturehouse, a dietary products retailer. Andries, Debackere, and Van Looy (2013) identify two distinct experimentation approaches for business model development, which they term "focused commitment" (i.e., early commitment to one specific business model followed by searches for a new business model, if the initial one is found not to be as effective as expected) and "simultaneous experimentation" (i.e., exploring multiple search paths in parallel to generate a variety of business model experiments and to avoid locking in on a suboptimal business model). Based on longitudinal case studies, the authors theorize that focused commitment has a positive effect on initial growth but jeopardizes long-term survival, with simultaneous experimentation having the exact opposite effects—that is, a negative effect on initial growth but enhancing the chances of long-term survival.

Building on these early contributions, Bocken and Snihur (2020) argue that the lean startup method could be generally useful for developing novel and impactful business models. Amit and Zott (2021) suggest specifically that when applying the lean startup methodology to building a new business model, managers and entrepreneurs should first translate their vision of the business model into a series of falsifiable hypotheses about the *What* (content), *How* (structure), *Who* (governance), and *Why* (value logic) of the activity system. Following that, managers should specify, prioritize, and test these hypotheses using a *minimum viable business model*, or MVBM, as the basis for testing. The lean startup method was originally formulated for products, and the original term used in the methodology is *minimum viable product*, or MVP. According to Eisenmann, Ries, and Dillard (2012), an MVP represents the smallest set of features and/or activities needed to falsify a hypothesis.

According to Amit and Zott (2021: 213), an MVBM represents "the smallest set of activities of the business model needed to falsify a business model hypothesis." The key objective of running a lean business model development process (as in the original version of the lean startup; see Ries, 2011) is to learn from these market-based tests in a fast and frugal way and reduce the uncertainty about the viability of the new model. Based on the test outcomes, a decision needs to be made whether to continue with the same business model, pivot and change the model, or abandon the business model. If the choice is to continue, the next set of business model hypotheses needs to be tested. In case of a pivot, the process will start again from the beginning. Building on Kirtley and O'Mahoney (2023), a business model pivot can be defined as a change in the firm's business model that reorients the firm's strategic direction through a modification of the firm's activity system content, structure, governance, and/or value logic, including the value proposition (Amit and Zott, 2021). Research on when and why entrepreneurs overcome their resistance to pivot their value proposition to their customers when they receive negative feedback from the market reveals that entrepreneurial

Figure 2
Lean Business Model Development



Source. Based on Exhibit 7.3 in Amit and Zott (2021).

experience, startup mentoring, and team size may enable entrepreneurs to pivot when they receive negative feedback (Burnell, Stevenson, & Fisher, 2023).

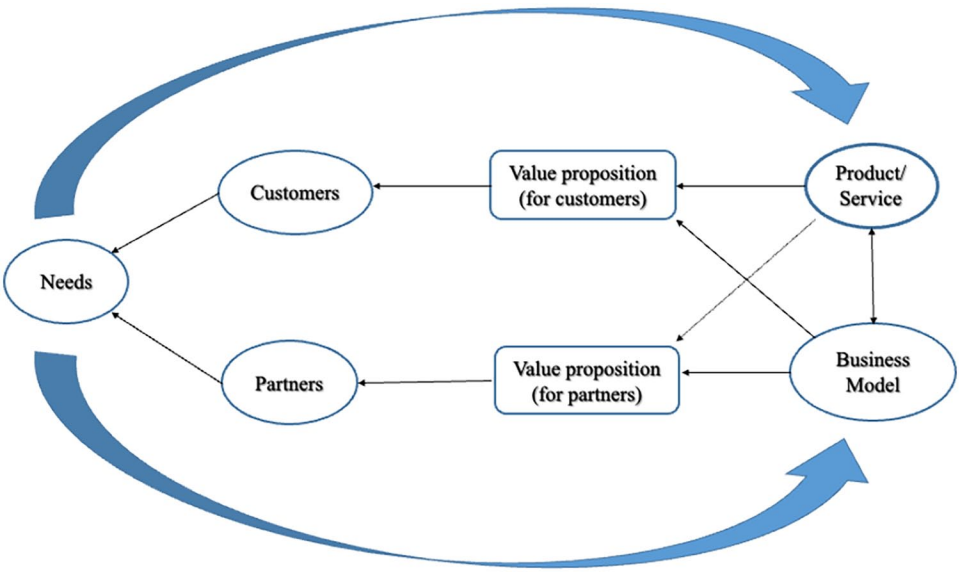
In summary, lean startup can be used as a structured search process for a viable new business model (see Figure 2 for an illustration).

In summary, the promise of applying lean startup to business models lies in probing the viability of new models in an efficient, structured, and effective manner. It is efficient and structured in the sense that it does not waste resources unnecessarily; speeds up development time; and proceeds in a rational, systematic manner that can be easily understood and communicated to others. It is effective in the sense that there is a high likelihood that a viable business model will be developed as a result of the consultation and close interaction with customers and other business model stakeholders.

A New Business Model Perspective for Lean Startup

Business model research contributes to lean startup in several important ways. First, it suggests expansions to the method that derive from the holistic, system-level nature of the business model perspective. Second, it reveals specific experimental subprocesses, refinements, parameters, and tools that need to be considered for successful business model design and innovation. We elaborate on these ideas next.

Figure 3
Value Proposition Sources and Beneficiaries



Source. Based on Exhibit 8.1 in Amit and Zott (2021).

Toward a more holistic view of value propositions. With respect to the holistic nature of the business model construct and the implications for lean startup research, we note that research on business models yields the following important insight. Part of the overall value proposition of a startup stems from the design of the business model itself, not just from the value created by the product/service. The value proposition centered on a product "explains the relationship among the performance of the product, the fulfilment of the customers' needs and the total cost to the customer over the customer relationship life cycle" (Payne & Frow, 2005: 172). While the focus of lean startup methodology is to discover and create product-market fit, as depicted by Figure 1 in Blank and Eckhardt (2023), business model research has shown that additional value can be unlocked by the business model itself and by creating a fit between the business model and the product (Zott & Amit, 2007, 2008). This can lead to an enhanced overall value proposition, as depicted in Figure 3.

Figure 3 indicates that any value proposition must be anchored on the needs of the ones for whom it is intended. It addresses those needs both through the product and the business model. For example, consider a restaurant food delivery service. A restaurant has the choice between two basic business models. It could provide the delivery itself (in-house delivery), or it could work with a delivery service such as Uber Eats. The value proposition of the core product is largely independent from the specifics of the enabling business model: customers typically value a hot, tasty meal delivered on time by a friendly delivery person; this does not depend on which technology or platform is utilized to deliver the meal. The business model, however, could generate additional benefits for the customer. Uber Eats, for instance, is part of Uber's loyalty program, Uber Rewards. Through this program, Uber Eats customers earn

points that can later be redeemed against other services provided by Uber, such as car rides. In this example, the production of the customer benefit through the business model (i.e., loyalty points) can be separated from the product. In short, business model research contributes to lean startup the insight that a new venture should strive for product-market-business model fit, not just for product-market fit alone.

Second, Figure 3 not only shows distinct *origins* of the value proposition (namely, business model and product), it also depicts distinct *beneficiaries*—namely customers and other business model stakeholders. Research on business models suggests considering *all* relevant stakeholders, not just customers, in the business model (Amit & Zott, 2001, 2021; Bocken & Snihur, 2020). These stakeholders need sufficient incentives (i.e., a strong value proposition, as shown in Figure 3) to participate in the business model and contribute to its success. The holistic perspective of the business model thus suggests that the partners' needs should be discovered and validated, too; they need to be included in the discovery-driven, hypothesis-testing process. The notion of value proposition therefore needs to consider all business model stakeholders who are important for the value creation in the model, not just customers; it is "a hypothesis formulated by a focal firm about how much value it creates for a stakeholder by way of providing tangible as well as intangible benefits that fulfill the stakeholder's needs, net of any costs that the stakeholder incurs and/or perceives" (Amit & Zott, 2021: 226).

Third, as Blank and Eckhardt (2023) highlight, lean startup focuses on the interaction between the focal firm and its customers to develop strong customer value propositions. The business model adds a strategic perspective to this (of course, without losing sight of the importance of total value creation). Business model scholars view the business model (not just the product, which is generated and delivered, and not just the resources and capabilities on which the business model is anchored) as a core issue for firm strategy (e.g., Snihur et al., 2021). The choice of business model complements a firm's corporate strategy—namely choices that relate to the scope of the firm (e.g., What industries and product market segments should the firm be in? How and when should the firm enter/exit these markets?). It also complements its business unit strategy, which centers on establishing and sustaining the competitive advantage of a firm in its product market(s). Indeed, business model design is most effective when it is strategic—that is, when it considers competitive interactions and the importance of competitive advantage.

This can be tricky in the case of innovative business models, where entrepreneurs need to strike a fine balance between ensuring the legitimacy of their innovation and protecting (strategically) against easy imitation from competitors. Such strategic business model design has been termed "robust" (Snihur et al., 2021). In the context of lean startup, legitimacy can be enhanced through close contact and probing with market participants to ensure the acceptability of the ensuing business model design, but business model research would suggest that additional consideration should be given to how to guard against giving away too much information in the context, thereby making it easy for competitors to quickly imitate the new business model (for more on strategic business model design, see Amit & Zott, 2021, Ch. 5).

Fourth, lean startup promotes a rigorous hypothesis-testing approach, which borrows important principles from the scientific method (Ehrig & Schmidt, 2022; Zellweger & Zenger, 2023). This scientific approach to entrepreneurship is increasingly shared by entrepreneurship scholars and taught in top business schools around the world. By using the canvas as a tool to identify possible hypotheses, the lean startup adopts a wide-tent approach to theory testing, aiming at testing as many important assumptions as possible. However, when there are many assumptions, it is difficult to decide which hypotheses to test first, which ones

second, and so on. The business model perspective provides guidance on prioritizing hypotheses to be tested by zooming in on the activities that need to be enabled by a focal firm, one of the nine fields of the canvas. It identifies important business model issues such as how customers would like to buy and consume a product or service rather than, or in addition to, what product or service they would like to buy. This insight can benefit the lean startup method, which has been challenged for lack of guidance on how to formulate hypotheses and how to pick the ones that should be tested first (Felin, Gambardella, Stern, & Zenger, 2020).

Toward a more nuanced contingency approach to lean startup. Besides the implications for lean startup that derive from the holistic and systemic nature of the business model construct as advanced by business model and strategy scholars (e.g., Amit & Zott, 2001, 2021; Casadesus-Masanell & Ricart, 2010; McDonald & Eisenhardt, 2020; Snihur & Zott, 2020; Teece, 2010), additional insight can be gleaned from an important substream of the literature that focuses on processes of business model design and innovation in startups or established firms (for an overview, see Amit & Zott, 2021, Chapters 6 & 7). This literature holds particular promise to inform lean startup by highlighting specific subprocesses, antecedents, contingency conditions, and tools—in general, refinements—for experimental approaches toward successful business model design.

A part of this literature deals with developing innovative business models "offline," for example, through industry-spanning search and complex system-level thinking (Snihur & Zott, 2020), analogical reasoning (Martins, Rindova, & Greenbaum, 2015), or conceptual combination (Bruni & Comacchio, 2023). Another part of this literature addresses "online" experimental methods, a key characteristic of lean startup. Consider for example *parallel play*, a process that has been found to be helpful to entrepreneurs in nascent markets who wish to develop their business models effectively (McDonald & Eisenhardt, 2020). Parallel play is a business model implementation approach inspired by the way preschool-aged children discover new things about the world by engaging in play. They tend to observe and imitate their peers instead of engaging in competitive behavior. Additionally, they like to explore different toys before selecting one as their favorite. The parallel play business model development process involves entrepreneurs borrowing ideas from startup peers in a nascent market and drawing on the templates of incumbents in adjacent markets that offer substitutes. Instead of committing to *one* specific business model option at the outset, entrepreneurs using parallel play deliberately test major assumptions about *various* business model alternatives *simultaneously*; in other words, they search for, consider, and test multiple business models at the same time.

This represents a deviation from "classic" lean startup method, which is centered on the pursuit of one single alternative at a time. Early business model process research has also explored the single (not parallel) processes that entrepreneurs and organizations use to evolve their business model over time. For example, Berends, Smits, Reymen, and Podoynitsyna et al. (2016) identify two process patterns that incumbent firms use to develop their business models over time: "drifting," which begins with experimental learning and then shifts to cognitive search, and "leaping," which starts with a focus on cognitive search and then shifts to experimental learning.

However, McDonald and Eisenhardt (2020) show that in nascent markets this may not be the best approach. Here, rather than committing too soon to a single preferred option, entrepreneurs should conduct an extensive, largely commitment-free search process for a new business model. Absence of commitment is important because committing too soon to one

specific business model alternative may entail the (potentially substantial) opportunity cost of putting that venture on a particular path and foreclosing other (potentially superior) business model options down the road.

Scholars have termed this choice problem the "paradox of entrepreneurship" (Gans, Stern, & Wu, 2019). It follows directly from one of the key tenets of the lean startup—namely that determining the best possible business model alternative necessitates acquiring knowledge that can solely be obtained through probing and practical experimentation (Blank, 2003, 2013; Ries, 2011), ideally in a discovery-driven manner (McGrath, 2010; McGrath & MacMillan, 1995, 2000). However, if such disciplined and systematic experimentation to mitigate uncertainty entails making a certain level of commitment, it could have an impact on the market and other potential paths to the extent that it might preclude the exploration of other viable business model alternatives. Based on their research, McGrath and MacMillan (2000) point out that a key part of an entrepreneurial mindset is to consider alternative opportunities before committing to one (also shown in Gruber, MacMillan, & Thompson, 2008, using a larger sample). Building on this idea, Gans et al. (2019) suggest that entrepreneurs should continue to search for possible business model solutions to the perceived customer need or problem until they reach the limits of learning in the absence of commitment. In other words, they should continue until further searching and commitment-free learning no longer seem worthwhile or possible. The notion of commitment-free search is consistent with recent extensions of lean startup that seek to include a wide-lens perspective on search into the initial framework (Gruber & Tal, 2017; Shepherd & Gruber, 2021). Given all this, Ehrig and Schmidt (2022) suggest the importance of testing premises underlying entrepreneurs' theories (and not just assumptions about specific business model alternatives) "to make inferences about assumptions that are not testable without making major investments, thus mitigating the 'paradox of entrepreneurship'" (2022: 1290).

Combining parallel play business model development (McDonald & Eisenhardt, 2020) with the idea of commitment-free search (Ehrig & Schmidt, 2022; Gans et al., 2019) suggests a refinement of the lean startup approach where entrepreneurs, particularly in nascent markets, should consider the market spaces in which they could play (Gruber & Tal, 2017) and then explore and rank *several* viable business models *in parallel* that align with their values, vision, intuition, and identity by gaining knowledge through experimentation and testing major assumptions, ultimately committing to the one that they find most promising in light of the evidence. This approach allows for active learning via testing and passive learning from observing loosely coupled and under-determined business models in practice, thereby reducing uncertainty and eventually enabling entrepreneurs to proceed with the preferred business model through the lean startup methodology.

Research on the roles of experimentation in the business modeling process (Bojovic, Genet, & Sabatier, 2018) furthermore suggests that experimentation not only serves the purpose of testing important assumptions about new business models but also helps to legitimate the new model and convince others (e.g., potential customers and other stakeholders) to embrace it. These results, taken together, point to the need for a richer and more nuanced understanding of the lean startup method.

Overall, research on business model design processes contributes to the lean startup literature the importance of actively searching for alternative business models in a given market space before making significant commitments and the value of engaging in further discovery-driven experimentation of a particular business model alternative (McGrath, 2010; McGrath &

MacMillan, 1995, 2000). By avoiding important, costly, and potentially irreversible choices up front, without properly considering alternatives, entrepreneurs can reduce uncertainty and increase the likelihood of success, especially in a nascent market environment, while signaling the value of the new business model to others and strategically legitimizing it.

Opportunities for Future Research on Business Models and Lean Startup

Research on both lean startups and business models is continually evolving, and the intersection of both fields offers exciting opportunities for future research. A first area of research concerns the antecedents—enablers as well as barriers—of lean business model design. Cognitive hurdles can be especially high during transformative change efforts that involve new technologies and business models. Lean methods represent new ways of thinking and working for many firms, and designing new business models also requires a new mindset of the participating managers (Amit & Zott, 2021, Chapter 3). Thus, the intersection of "lean startup" and "business model" can be particularly challenging for firms and individuals whose routines and prevailing mental models are anchored on established, conventional, nonlean, and product-centric (instead of business model–centric) schemata. How to overcome such strong cognitive barriers is a subject worthy of future inquiry.

Perhaps framing the lean business model design effort as an opportunity rather than a threat or challenge will be helpful to overcoming strong cognitive barriers, as suggested by Snihur, Zott, and Kiss (2023). Their research of incumbents' reaction to Amazon's entry with a radically new business model into the bookselling industry identifies several distinct dimensions of senior leaders' opportunity framing that might matter, such as intensity, concreteness, future orientation, and inclusiveness. How important are these dimensions, individually and as a whole, for cognitively facilitating lean business model design and innovation? And what skills should managers possess, acquire, or deepen to participate in lean business model design to facilitate the process? Amit and Zott (2021, Chapter 12) point to business model design skills and mindset as well as business model implementation and management skills as potentially important. However, what precise skillset is needed for lean business modelling? Since business model innovation and lean methods, jointly deployed, may arouse strong negative emotions in oneself and others (such as entrepreneurial team members, managers, and workers), how important are leaders' emotion management skills (Huy & Zott, 2019) in this context?

A second fertile area for future research concerns the process of lean business model design and its contingency conditions. Bocken and Snihur (2020) wonder what the details of the process really are in terms of content, timing, and sequencing of steps, participants, and organization (e.g., roles and responsibilities)? For example, consider pivoting as a result of unexpected feedback from hypothesis tests (see Figure 2). How can participating managers ensure that such pivots are performed at the right time, in the right direction, and with the right mix of resources, thereby maximizing the firm's chances of success? How can entrepreneurs avoid "bad" pivots? It is important to understand what hypotheses to test and how to interpret test results (e.g., knowing when test results suggest the need for pivoting to another business model). Equally important, however, is to take appropriate corrective action and to know what new and potentially better business model to pivot toward. It is also an intriguing question, how to integrate ideas that involve nonsystematic, toddler-like action such as

"parallel play" (McDonald & Eisenhardt, 2020) into a highly systematic framework that relies on scientific, adult-like principles such as lean startup.

Furthermore, all actual and potential contingency conditions identified in this paper merit further inquiry into how precisely they affect lean business model design processes and their outcomes, namely, (1) composition and educational background of the founding team (Leatherbee & Katila, 2020) as well as other hitherto unidentified but potentially important individual or team-level characteristics; (2) training of the participants in the lean business model design effort, not just training in the scientific method (Camuffo et al., 2020) but also in business model mindset and design thinking, among other things (Amit & Zott, 2021); (3) startup versus established firm context and other contexts (e.g., private versus public, for-profit versus social venture, etc.)—there is precious little research, for instance, on lean startup methods applied in large corporations or business model innovation in governmental and not-for-profit organizations and even less research on lean business model development and how it is affected by the context in which it is deployed; and (4) degree of uncertainty (e.g., nascent versus established markets) to which the lean business model design team is exposed.

A third promising area of future research concerns the outcomes and broader implications of lean business model development. How do you ensure a successful outcome of the lean development effort in light of its considerable challenges and complexities, such as the need to satisfy a multiplicity of business model stakeholders, each of whom requires a strong value proposition? How do you build the required multilevel links and mechanisms? How do you build resilient business models and not "just" business models that exhibit good product-market-business model fit? How do you build highly innovative, groundbreaking business models and not "just" business models that are incrementally (or not at all) new? How do you build scalable business models and business models that offer a sustainable competitive advantage—one that beats the competition and doesn't "just" make customers happy? And, lastly, how do you ensure that business models, designed in a lean startup fashion, do not "just" offer benefits to the focal firm and its associated business model stakeholders but to society as a whole (Bocken & Snihur, 2020)?

In particular, how do lean startup processes have to be modified to ensure that the ensuing business models serve a higher purpose and truly create positive value for society, contribute to democracy, and make the world a better place? For example, how do you design business models in a lean way that address the "grand challenges" of our time (like climate change, environmental pollution, poverty, or hunger; see Bocken, Heidenreich, Spieth, Tucci, & Zott, 2022)? Snihur and Markman (2023) suggest that future research on business models should address topics related to business model portfolios, business model competition, and business models that address environmental sustainability. Lastly, what is the "dark side" of lean business model design, and how do you mitigate or avoid it altogether?

Conclusion

The intersection between lean startup and research on business models is interesting, important, and holds much promise for research and practice. Lean startup was originally developed to help startups minimize the risk and cost of creating new products and services that display high product-market fit. Increasingly, established corporations have turned to the approach and attempted to embrace at least parts of the lean startup methodology. Research

Table 1
Similarities and Differences Between Lean Startup and Research on Business Models

Lean Startup	Business Model Research
Focus on **value creation** for customers through product-market fit	Focus on **total value creation** for customers and all other stakeholders of the business model, which is a source of value creation in addition to the value created by the product and hence the search for product-market-business model fit
Uses canvas as the tool to incorporate a **holistic view** into the analysis	Embodies **holistic view** by conceptualizing the business model as a system of interdependent activities aimed at value creation, delivery, and appropriation and incorporates strategic considerations into the business model design process
Anchors the development of a new venture on the discovery of customers' **needs** through a systematic approach	Business model research suggests that when applying the lean startup method to building a new business model, one should focus on all stakeholders' **needs** and translate the resulting vision about the appropriate business model design into a series of falsifiable hypotheses about the content, structure, governance, and value logic of the activity system
Centers on the pursuit of **testing one alternative** product configuration **at a time**	Business model research suggests alternative methods of needs discovery such as an extensive, largely commitment-free search for a new business model by **testing** major assumptions about **various** business model **alternatives simultaneously**

on the design of business models was originally inspired by the phenomenon of internet-enabled e-businesses (Amit & Zott, 2001) and has now become a core strategic imperative that every start-up and corporate enterprise needs to address (Amit & Zott, 2021). In addition to the strategic questions of *what market segments to serve* and *how to compete in those market segments*, entrepreneurs and managers need to ask themselves *how to do business*—that is, *what business model to adopt*.

We depict our summary comparison of the lean startup method and research on business models in Table 1.

As Table 1 suggests, both approaches inform the design of young ventures as well as the redesign and rejuvenation of established businesses. Importantly, as we have highlighted in this paper, they also speak to and inform each other. Lean startup provides a useful process lens for business model designers and innovators. In return, scholarship on business models can help the lean startup method become even more valuable as a process approach by:

- Widening the scope of the analysis from the product to the entire activity system
- Extending the focus on interacting with customers to interacting with stakeholders
- Adding strategic considerations
- Prioritizing hypotheses to test
- Revealing specific subprocesses, refinements, antecedents, contingency conditions, and tools relevant for lean business model design and innovation

By claiming that lean startup and business model research can be viewed as complementary (with the business model providing a strong, theoretically anchored content framework, and the lean startup providing a science-driven process approach), it is our hope that these distinct lenses increasingly cross-pollinate and enhance each other and contribute to the development of a more complete theory of entrepreneurship that can apply to independent new ventures as well as corporate entrepreneurial contexts.

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Notes

1. See also https://steveblank.com/2019/05/07/how-to-stop-playing-target-market-roulette-a-new-addition-to-the-lean-toolset/

2. A recent essay by Felin et al. (2020) furthermore points out some possible unintended consequences of the lean startup approach in its original form. The authors suggest that the emphasis of lean startup on observable feedback from users' experience may restrict radical innovation that could lead to substantial value creation. Instead, the authors surmise that the focus of lean startup on incremental experiments may generate only incremental value.

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