

Organizational Learning and Its Influence on the Lean Startup: A Unique Lens from Which to View this Popular Entrepreneurship Methodology

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Abstract

Organizational learning, a broad and diverse field that draws on influences from multiple disciplines, embodies varied definitions, ranging from cognition to process. It represents a dynamic process in which a firm acquires, embeds, transfers, and exploits knowledge. In examining the extant literature, this paper explores three provocative questions specific to organizational learning and entrepreneurial ventures (1) what areas of organization learning provides an underlying foundation for entrepreneurial ventures in exploring and advancing their innovations; (2) what areas within entrepreneurship embrace organizational learning concepts; and (3) how does organizational learning support the hypothesis-driven methodology seen with the lean startup. Multiple organizational learning concepts apply to the entrepreneurial venture. Notable are the concepts of ambidexterity involving exploration versus exploitation; the practices of experimentation, distant search, learning from failure, and adaptation; the influence of behavioral theory and psychology; and the 4Is learning framework that fosters a “feed-forward”/“feedback” tension leading to the advancement of innovations within a firm and beyond. The opportunity recognition process and the lean startup methodologies represent two entrepreneurship areas to which organizational learning applies. Specific interest relates to the lean startup, which draws on multiple organizational learning concepts, including Argyris and Schon’s theory-in-use and double-loop learning processes, experimentation, learning from failure, and adaptation. Of interest is this methodology’s impact on the firm to advance its innovative products and business models within the venture and its external venture ecosystem. This paper posits that one can use an organizational learning lens vis-a-vis Crossan’s 4Is framework and the “feed-forward”/“feedback” dynamic. Such perspective offers a fascinating opportunity to explore questions concerning the lean startup’s impact within the organization and its local venture ecosystem, its journey (vis-à-vis the “feed-forward”/“feedback” process), and associated outcomes. Further, it proposes a model that integrates lean startup practices situated within the 4I’s model that considers the “feed-forward” and “feedback” processes and the influence of endogenous and exogenous influences.

Keywords: 4Is Framework • Adaptation • Diffusion of innovation • Entrepreneurial search • Experimentation • Exploration • Exploitation • Feed-forward • Feedback • Hypothesis-driven entrepreneurship • Lean startup • Lean startup • Organizational learning • Validated learning

Introduction

The field of organizational learning encompasses a vast body of literature. It is a broad and diverse field that draws on influences from multiple disciplines, particularly business management, psychology, philosophy, and sociology [1]. Most contributions predominantly focus on areas that exist within a traditional organizational setting (e.g., corporation, academic, government).

One can view an entrepreneurial venture as an organization. However, it does not behave like an established entity, concerned with exploitation, revenues, profits, and corporate growth. Instead, the startup venture focuses on exploratory activities as it searches for an appropriate business model to scale [2]. Contributions exist within the literature that extend organizational learning foundational concepts into the entrepreneurship space [1,3-6]. In many ways, entrepreneurial activity is an ongoing learning process from customers to suppliers to partners of what to do and what not to do [6].

Multiple practices emanate from the organizational learning literature and pervade entrepreneurial processes. Most notable include exploration and experimentation, and theory-in-use single- and double-loop learning

processes [7,8]. Another essential organizational learning concept applied in the entrepreneur space involves the concept of “search,” particularly involving more distant exploration [4,9]. Furthermore, the 4Is framework for strategic renewal concept can extend into the entrepreneurial venture ecosystem, in which the tension between “feed-forward” and “feedback” processes lead to emerging innovations [1]. Such a concept emulates Rogers’ diffusion of innovation theory, as communities embrace new ideas and innovations [10].

The lean startup is a popular methodology used in the startup space over the past decade. It involves a hypothesis-driven approach using a build-measure-learn cycle to test minimum viable products and business models [11,12]. Such efforts lead to validated learning in which entrepreneurs discard, iterate, pivot, or persevere their ideas. This approach allows entrepreneurs to “feed-forward” their innovations based on data to scale their new products, business models, and companies. Some scholars, such as Mansoori [5], have found that such methodology is rooted in theory-in-use and double-loop learning processes. Others, such as Contigiani and Levinthal [3], situate lean startup within the organizational learning domain. These scholars suggest that researchers use this lens to pose questions and move forward with a research agenda [3]. Finally, other academics, such as Ladd and colleagues [13], find foundational support for lean startup practice as a dynamic capability, another organizational learning process.

Hence, this paper aims to explore the areas of organizational learning and entrepreneurship. It seeks to address three essential questions and unpack relevant considerations to establish a direction for future research concerning the impact of this methodology on the venture’s organization and performance. The first seeks to identify organizational learning areas that provide an underlying foundation for entrepreneurial ventures in exploring and advancing their innovations. The next focuses on what areas within entrepreneurship embrace organizational learning concepts. The final query examines how organizational learning supports the hypothesis-driven methodology seen with the lean startup.

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This narrative addresses these questions by exploring the extant literature relating to the following stream of topics. The first part covers organizational learning. This section starts by examining organizational learning definitions, characterizations, and processes. It segues to cover multiple organizational learning processes that specifically relate to entrepreneurship. This section transitions to discussing entrepreneurship contributions that offer relevant discussion related to underlying organization learning practices. The third section examines the lean startup, its antecedents, and underlying support that connects organizational learning to this methodology. The paper closes by exploring space to contribute to the literature specific to organizational learning and the lean startup. There is interest in how research may view the impact of lean startup, using the lens of the 4I's framework, on organizational development and functional performance parameters (e.g., milestone achievement, capitalization, revenue generation). This discussion leads to several provocative questions concerning the lean startup methodology and organization learning. Further, it offers a prototypical model that bridges the 4Is and lean startup practices. Finally, it closes by posing potential areas of contribution to theory and practice.

Characterizing Organizational Learning

Broad base of definitions

Defining organizational learning is not a straightforward endeavor. In many ways, the simple definition of learning (i.e., a change in knowledge or skills due to experience and applying it) does not fulfill it [14]. It is also not something that scholars and scientists consider intentional learning or an effort or process to improve effectiveness [15].

Organizational learning is more complicated than the concept of learning itself. Scholars distinguish it from individual learning, such that it is not a sum of the knowledge gain by each member of the firm [16,17]. Fiol and Lyles [16] explain that organizational learning plays a strategic role by allowing firms to understand and read their environments to create and evaluate their market approaches. Further, they highlight that firms create and maintain learning processes that influence their employees and diffuse to others vis-à-vis history, norms, and routines [16].

Multiple "schools of thought" concerning organizational learning offer diverse views around the concept, including developmental, economic, managerial, and process [1]. Several scholars offer different perspectives on the definition [15,16,18-22]. Fiol and Lyles [16] offer one, with which many scholars concur. They explain that organizational learning involves a change in an organization's knowledge, which occurs due to the experience it acquires [16]. Further, these scholars add that it improves the firm's efforts due to increases in knowledge and understanding [16].

According to Argote [18], this knowledge can materialize changes in behaviors, cognition, and routines. Levitt and March [21], in their prior work, describe it as a capacity to convert interpretations from history and/or experience into routines to guide a firm's activity and behavior moving forward into the future. To this end, others support this view that organizational learning reveals itself as changes in the actions, behaviors, beliefs, cognitions, improvements, and/or performance within the firm due to experience [19,22]. Adding to these perspectives, De Geus [23] expounds on sharing cognitive maps specific to the organization, its markets, and its competition. Further, two behavioral scholars, Argyris and Schon [7], describe it within the context of detecting and correcting errors.

Two other leading scholars, Huber and Argote [15,18], add to acquisition that of embeddedness, transference, and value. When such a process occurs, several units within a firm acquire the knowledge and realize its potential utility or value [15]. Thus, the definition involves acquisition (creation), retention, and transfer of knowledge characteristics within the organization [18]. Interestingly, this process can perpetuate and enhance itself to improve the firm and contribute to the venture's growth. More specifically, as an organization gathers experience, it uses these learnings and insights to create new knowledge that the firm can share with other organization units and embed it throughout the firm [18].

Huber [15], a leading academic from the University of Texas (McCombs), adds to this definition. He acknowledges the behavioral perspective; organization learning involves processing information into a range of behavioral changes [15]. This scholar also recognizes two widely-held assumptions concerning the definition of organizational learning [15]. These assumptions consider that organization learning (1) occurs when any of a firm's units acquire knowledge that it views as offering potential (or real) utility or value to the overall entity, and (2) involves learning something, even if only a part of the organization learns [15]. However, his writings indicate that there is much more [15].

Organizational learning as a process

To this end, both Argote and Huber [15,18] characterize organization learning as a continuous and collective process throughout the firm to take in, understand, and act (or react) to external or internal changes. Generally, the core components involve the acquisition (creation), retention, and transfer of knowledge (Figure 1) [15]. However, there is much to the process than these simple pieces.

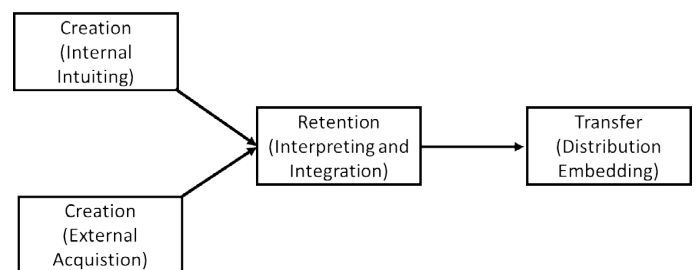


Figure 1. Core components involved in the process of embedding organizational knowledge (Adapted, Argote, 2011) [18].

In his seminal piece, Huber [15] articulates four constructs and expands on multiple subprocesses (Figure 2). These constructs– 1) knowledge acquisition; (2) information distribution; (3) information interpretation, and (4) organizational memory– help to delineate the depth of complexity in the literature, even in the early 1990s, associated with organizational learning [15]. In discussing these constructs, Huber [15] devotes considerable time relates to knowledge acquisition [15]. The construct encompasses several learning subprocesses: congenital, experiential, and vicarious learning, grafting, and search and noticing [15]. The largest of these subprocesses is experiential, in which he discusses the literature underlying organizational experiments, organizational self-appraisal, experimenting organizations, unintentional or unsystematic learning, and experience-based learning curves [15]. The other noteworthy process involves searching and noticing, in which he describes scanning, focused search, and performance monitoring [15]. This scholar also devotes attention to two other constructs; information interpretation and organizational memory [15]. In reviewing the information interpretation construct, he examines the works concerning subprocesses of cognitive maps and framing, media richness, information overload, and unlearning [15]. Finally, under organizational memory, he explores the support around the storing and retrieving memory and computer-based organizational memory [15].

Argote [18] offers an updated view, in which she characterizes several subprocesses: (1) creation; (2) retention; and (3) transference of knowledge. Organization learning ensues when a firm acquires experience(s) and creates knowledge from such events [18]. To this end, other scholars cite multiple dimensions of experience that influence the structure and function of knowledge creation within firms: organizational, spatial, temporal, content, and artificiality [21,24-30]. Argote [18] recognizes such pieces in her comments that organizational learning translates, embeds, and shares the knowledge or insights gained throughout the firm [18].

The conveyance of knowledge within the organization is essential to this process. Scholars highlight that multiple contextual factors influence transference, including those of alliances, cognitive (abilities and processes), emotion, motivation, relational (interconnectivity) and social networks, routines, and templates [31-40].

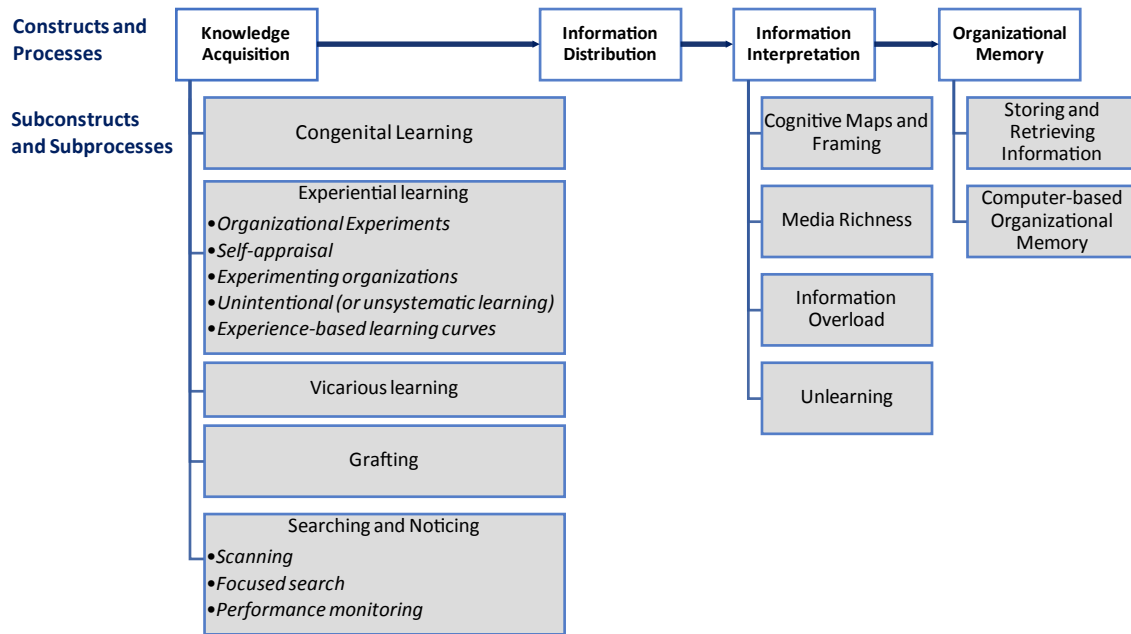


Figure 2. Four core constructs and expands on multiple sub-constructs and processes that define organizational learning (adapted, Huber, 1991) [15].

Ultimately, as Argote [24] comments, such transferred learnings embed within the organization. This retained knowledge situates within the firm's organizational memory, experiences, knowledge retention, and processes [18,32,33]. To this end, Fiol and Lyles [16] observe that such an effort results in a firm developing and sharing of cognitive systems, connections, history, and repositories. Kieser and Koch [41] highlight knowledge repositories; these places essential to enhance retention and organizational memory. Such repositories include routines, rules, transactive memory systems, knowledgebase, tools, and history [18,24,42,43].

It is essential to recognize that the organizational learning process engages several other considerations. First, as Argote [24] observes, a firm develops knowledge and learns at multiple levels: individual, group, intra-organization, and inter-organization. This process starts with the individual employee's knowledge gained from some type of experience (e.g., trial and error, outside learning, experimentation) [18,44]. This knowledge then moves beyond the individual to the group level and ultimately embeds throughout the firm in knowledge reservoirs, such as routines, social networks, and tools [18,44]. Second, per Lumpkin and Lichtenstein [4], it considers process improvement and expansion into new spaces by developing new knowledge and understandings, along with identifying and correcting misalignments. Third, Fiol and Lyles [16] recognize that contextual factors influence the learning process, including organizational culture, firm structure, strategic attitude, and complexity of both the internal and external environments.

A dynamic capability to offer competitive advantage

Teece and colleagues [45] introduced the concept of dynamic capabilities, which defines a firm's higher-level competencies. They explain that such capabilities allow a firm to integrate, build, and reconfigure internal and external competencies to engage a dynamic business environment and provide competitive advantage [45]. These scholars add that these abilities determine the firm's emphasis and swiftness in aligning their resources to the business environment in response to identified opportunities, customer needs, or competitive threats [45]. Finally, they explain that these capabilities are multifaceted, and a firm might not possess all [46].

Teece [46], in a later paper concerning this concept and its influence on the development of a business model, explains that dynamic capabilities allow a firm to sense, seize, and transform, and directly influences each phase (Figure 3). In using the term sensing, this academic leader indicates identifying opportunities, particularly related to technology [46]. He adds that sensing leads to seizing [46]. Here, the firm designs and refines its business

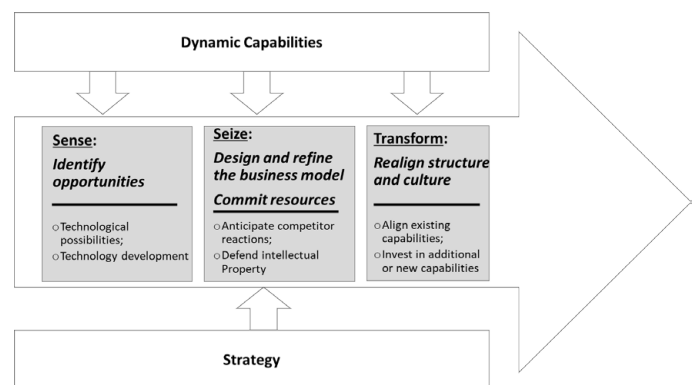


Figure 3. Dynamic Capabilities, as an Organizational Learning Process, and Its Influence on Business Model Development- Sense, Seize, and Transform (Adapted, Teece, 2010) [51].

model and commits resources [46]. This phase requires a firm to anticipate competitor responses and protect intellectual property [46]. He notes that strategy influences the seize phase [46]. Then, this scholar continues that sensing leads to the transformation phase, in which the firm aligns existing capabilities or adds additional capabilities [46].

This strategy thought leader notes that managerial rules, along with organizational routines and processes, are part of and support a firm's dynamic capabilities [46]. In many ways, organizational learning is a part of a firm's dynamic capabilities. Notably, this capability allows a firm to develop set routines and new ones to enhance its competitive position [47].

To this end, Levinthal and March [9] explain that organizational learning can influence a firm's competitive advantage. From a positive perspective, these scholars note that the most notable aspect involves improving average performance [9]. They add that this enhanced capability occurs at multiple levels of the firm. It is not just at the individual level but extends throughout the organization, vis-a-vis the collective's routinization [9]. Finally, these authors note that this capacity is a prime contributor to enhancing a firm's competitive position. Improved performance minimizes variations and waste, leading to consistency, efficiency, and reliability [9].

However, such a perspective leads to a paradoxical position. According to Levinthal and March [9], as the firm increases performance reliability throughout the firm through routinization, it minimizes the opportunity for deviations associated with exploratory behavior. Depending on the

environment, losing such a capacity can be a disadvantage [9]. In highly competitive environments that entail multiple actors, primacy requires ability, reliability, and a distinctive offering to set an individual or company apart [9]. Such characteristics can be in the product, service, business model, or customer experience to gain a competitive advantage [9]. Thus, establishing primacy and competitive advantage requires exploration, which in some ways can be fruitless [9]. However, market leadership requires such efforts so the firm can find a unique value proposition [9]. Once a firm establishes that breakthrough leadership position, it can solidify that place through exploitation [9].

Relevant Organizational Learning Practices

Exploration vs. exploitation- the need for ambidexterity

Considering the previous contextual factors, multiple scholars observe that firms apportion their focus and resources between two significant forces—exploration and exploitation (Figure 4) [8,9,48-50]. Levinthal and March [9] explain that firms engage in exploration (or search efforts) in pursuing new possibilities and knowledge, particularly that of the "known unknowns" and the "unknown unknowns" to remain viable and to facilitate future growth. Hence, exploration argues for the ongoing need for organizational learning to foster renewal [44]. Such a focus stresses research and an organization's learning processes (eg., creation, transfer, interpret, embed) within the firm or its acquisition of such capabilities or outputs. Levinthal and March [9], however, do contrast exploration with that of exploitation. This activity emphasizes the advancement and utilization of established knowledge or certainties [9]. According to Teece [51], this focus is essential for the firm to commercialize their knowledge capabilities and technologies.

Multiple scholars observe that firms struggle to balance these two forces; both are requisite, akin to yin and yang's interconnectedness and interdependence [8,9,52]. Concerns with exploration situate in the reality that a firm predominantly exploring suffers from its inability to reap the rewards of its knowledge and maintain viability from such returns [8,9,50]. Alternatively, issues exist for firms that excessively exploit [8,9]. According to Levinthal and March [9], these entities become outdated or surpassed by innovation because exploitive efforts fails to generate new offerings or novelties to sustain a competitive advantage. Sometimes one of these forces drives out the other; this dynamic occurs when an organization becomes entrapped in excessive exploration or exploitation due to environmental adaptation or positive feedback over the near term [9]. Hence, scholars accentuate the need for ambidexterity to balance these two forces [9,52,53]. In severe cases, per Levinthal and Marc [9], an emphasis on exploitation dominates to ensure firm survival. However, these scholars note that if a firm is to command a primacy position, exploration is essential, as such an effort leads to learning and innovation [9].

Experimentation

March [8] describes experimentation as an essential practice within the exploration process. Bingham and Davis [54] characterize experimentation as

a straightforward learning process. Huber [15] categorizes experimentation as an organizational learning subprocess under that of experience and describes it as a problem-solving method. Still, others highlight the learning role of experimentation [55,56]. Further, March [8] views it as an essential component in the innovation process and account for a significant expenditure of the time and resources needed with the effort.

Multiple scholars explain that experimentation involves a process [54,57,58]. According to Cook and Campbell [57], this learning activity occurs under controlled conditions. Such allows individuals to test hypotheses and causal propositions that will lead to new knowledge [57,59]. Bingham and Davis [55] add that firms deliberately plan the experiment and vary the conditions to produce an understanding of how independent and dependent variables are related. In describing a system for experimentation, Thomke [60] explains that organizations intentionally design the experiment, change the inputs "off-line" (i.e., non-market setting) using comparable conditions, and utilize standard metrics to assess outputs. He adds that comparing results from these variable inputs to outcomes will explain the cause and effect (input-output) relationship [60]. Finally, Miner et al. [61] offer that a post-event review is essential to translate the experimental findings into knowledge to use and embed.

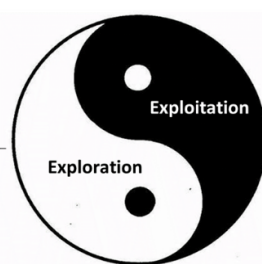
Interestingly, per Bingham and Davis [54], experimental learning involves initiatives using simple, easy to modify prototypes that can lead to more developed designs or solutions [54]. These low-cost tests allow firms to conduct multiple experiments without having to suffer from significant misadventure and resource commitment [54]. Adding to this perspective, Bojovic et al. [56] describe these efforts as purposeful interactions. Such activities are small in scale, involving individually one type of partner or customer, continuous in nature, and testing one or more components of a business model [56]. Furthermore, March [8] finds that using multiple iterations with an electrically programmable logic device outperformed the process for application-specific integrated circuits by a factor of 2.2 (person-months). As Pisano [29] notes, the process involves integrating the learnings from these tests into firm actions and activities. Bingham and Davis [54] indicate that such efforts using small scale tests help managers prepare for the future. Such elements are like the build-measure-learn cycles within the lean startup methodology [12]

Thomke [60] advocates the strategy for smaller, purposeful, and rapid testing by outlining four essential steps for "enlightened experimentation." First, he explains that firms need to organize rapid testing by looking at organizational considerations (e.g., routines, boundaries, and incentives) [60]. Second, he emphasizes that firms fail early and often in the development process and ensure proper methods and watch for implementation errors [60]. Third, this scholar stresses that firms should anticipate and exploit their early learnings but recognize the existing trade-offs between expense and fidelity testing [60]. Thomke [60] coins the term of "front-loading" the experiment in referring to this practice and underscores the need to recognize its value. Finally, this academic encourages the combining of new and traditional technologies [60].

In addition to the short-rapid tests with purposeful interactions, multiple scholars recognize another form of experimentation, experimental projects [56,60]. These are larger-scale, time-bound projects [56]. According to

Considerations

- Search efforts pursue new possibilities and knowledge to remain viable and foster future growth
- Fosters Renewal
- Stresses research and an organization's learning processes or the acquisition such capabilities or outputs.
- Concerns situate in the reality that a firm predominantly exploring suffers from its inability to reap the rewards of its knowledge and maintain viability from such returns



Considerations

- Emphasizes the advancement and utilization of established knowledge or certainties
- Is essential for the firm to commercialize their knowledge capabilities and technologies
- issues exist for firms that excessively exploit, which become outdated or are surpassed by innovation because such activity fails to generate new offerings or novelties to sustain a competitive advantage

Figure 4. The Yin and Yang of Exploration and Exploitation of Organizational Learning [8,9,44].

Bojovic and colleagues [56], they are purposeful with multiple hypotheses and involve one or more partners. Typically, per Cooper [62], these fit within a stage-gate setting. Additionally, Andries et al. [63] cite two primary strategies for learning and experimentation under uncertainty and involve different adaptation approaches over time.

Further, Levinthal [64] describes one as an incremental, step-wise approach, otherwise a “local” or a “related” search or focused commitment. Such a strategy offers in solution sets offering an incremental change in an adjacent area and ultimately results in an arrangement not distinctly different from the original [64,65]. Scholars do describe a much more radical change to the configuration by altering multiple elements simultaneously, or a “distant search,” “path-creating search,” or “search through long jumps” [64,66]. This strategy, per Levinthal [64], leads to firms experimenting with arrangements that significantly differ from their original. Addressing these two paths, Andries et al. [63] explore six longitudinal case studies. They discover that firms using a focused commitment approach experience initial growth that appears greater than those using simultaneous experimentation [63]. However, these Belgian scholars note that such an effort occurs at the expense of diversity that can affect long-term survival [63]. Alternatively, these researchers report that those using simultaneous experimentation gain the advantage of achieving a more significant variation that facilitates long-term survival and in a more resource-efficient way [63].

Experimentation occurs in different parts of a firm. According to Thomke [60], the most notable place is in product development. He explains that such practices allow for product innovations and new technologies to emerge [67]. Levinthal and March [9] add that this longer-term exploration sets the stage for primacy in a field.

Another significant area involves the area of business model innovation [55,56]. Bojovic et al. [56] find that experimentation in the business modeling process provides for learning and knowledge development and legitimization and enactment. They observe that experimentation does play signaling and convincing roles with customers and stakeholders to embrace the model [56]. Other places where experimentation occurs include manufacturing, supply chain management, and marketing processes [68-71]. Multiple examples stand out with lean manufacturing [72,73]. Other non-peer review examples exist within the marketing space [68,69].

Failure as part of the learning process

Inherent to the process of experimentation is that of failure. Cannon and Edmundson [74] observe that firms do recognize its importance. They define failure as a departure from expected and desired results and ranges from technical to commercial to interpersonal areas [74]. Unfortunately, while these academics note that while firms espouse the importance of failure and learning from it, these entities tend to dwell on the negative aspects due to the psychological and sociological challenges that individuals and organizations associate with the event and learning from it [74].

When considering success and failure from a firm's behavioral perspective, scholars observe that organizations and their leaders view the two quite different [9,65]. Cyert and March [65] note that success stabilizes organizational knowledge. They observe that with success, firms tend to ignore outside information, focus on local search, simplify decision making (or establish heuristics), and become overconfident [9,65,75]. Alternatively, some scholars explain that failure challenges the firm's organizational knowledge stability and the status quo [65,75]. Additionally, they note that failure points not only to gaps in a firm's knowledge [65,75]. Such occurrences lead to reflection and the desire to search for new information and learnings, sometimes a trap in itself [9,65,75].

To this end, failure can be a good teacher, but with some boundaries. Bajwa et al. [76] note that software firms embrace failure positively. They add this perspective is due to the ambiguous, unpredictable nature of an industry where 75% to 90% of firms fail [76]. These researchers see that such intermediate failures provide useful learnings, offering the opportunity to pivot, which prevents later failures that can prove fatal [76]. Adding to this observation are Madsen and Desai's [75] findings in examining the orbital

launch industry. These scholars report that firms learn more effectively from failure and retain these learnings with slower decay [75]. They also identify boundary conditions, including prior experience and the size of the failure (large versus small), influence the organization's learning process [75]. Based on his examination of Panel Study of Income Dynamics (PSID) data, Parker [77] discovers that startups derive learning benefits from venturing, including failure. This author argues for re-entry supports, even with firms that do not perform well initially [77]. In another study involving the U.S. banking industry, Kim and Miner [78] report mixed results concerning failure, suggesting that learnings may vary within industries and their origins. They explain that firms can learn vicariously from other institutions' experiences and glean more from failures within the local (vs. non-local) community [78]. Interestingly, they see a difference between institutions with origins in banking vs. thrift industries concerning value from near failure and failure experiences banks more from near failure and thrifts equally from both [78].

While firms espouse the learning from failure rhetoric, it appears that few reflect such aspirations in their emergent behavior. Cannon and Edmunds put forth this consideration in their *Long Range Planning* paper, examining the topic of firms failing to learn and learning to fail [74]. In this piece, these authors cover a diversity of topics, beginning with defining failure and contrast small vs. significant failures [74].

Cannon and Edmundson [74] delve into three essential processes for organizational learning from failure. The first is the proactive and timely identifying and exposing failure, such as missing warning signs, inaccessibility of data, and failing to identify a trigger in a specific window of time due to accepted belief [74]. They encourage cultures that support the identification of failure [74]. The second step involves thoughtful analysis and learning (e.g., after-action review and morbidity and mortality conferences) [74]. This effort requires disassociating the negative psychological aspect personally, engaging inquiry, openness, and ambiguity, and minimizing heuristics and psychological biases that can influence the process [74]. The third area extorts that of deliberate experimentation [74]. These authors note that some firms actively seek to increase their failure rate through active experimentation to promote learning and innovation [74]. They add that such organizations (versus those that do not experiment) realize more significant innovation, productivity, and success [74]. However, these scholars note that challenges exist due to organizational success orientations and confirmation biases [74].

However, effective deliberate experimentation practices require that individuals design and test their ideas in a dispassion manner, align incentives to support the practice (even with failures), and explore offline and online modes [74].

Adaptation

A significant area in the organizational learning literature involves adaptation, a process by which a firm adjusts to its environment [16,79]. Some academics describe adaptation as a defensive adjustment or an organizational adjustment with some type of action/outcome links (e.g., deviation-reduction, deviation-amplification) [80,81]. Scholars emphasize that adaptation and learning are fundamental tenants for intelligent and capable organizational activities and behaviors [15,21,24,65,79]. However, they disagree about equating learning with adaptation; some find it misleading, and others qualify adaptation involving different learning levels [16,80-82].

Cyert and March [65] characterize adaptation in their seminal contribution, “A Behavioral Theory of The Firm,” as the adaptation of a concern's behavior and routines that occur over time. In this work, these scholars emphasize the adaptation of goals, attention rules, and search rules [65,83]. The first involves goal setting and realignment. These scholars explain that part of the learning process involves setting goals and changing these aspirations over time [65]. In setting goals, they observe that firms should consider their own past goals and performance and comparable organizations [65]. These academics add that the changing of goals can occur due to internal (e.g., leadership changes) and external (e.g., market or economic environment) factors as challenges arise [65]. The next area involves the area of attention rules. These rules establish priorities [65]. Examples include employee

performance evaluation or firm benchmarking performance criteria [65].

Finally, multiple scholars observed that search adaptation refers to rules governing the firm's ability to discover solutions [84]. Since such rules depend on individual problems, per Gibbons [83], they change according to the circumstance. Usually, Cyert and March [65] indicate that firms default to a specific search strategy routine, particularly if the method had been previously successful. However, they add that these rules will rest on previous experiences, including successes and failures, with current and alternative search rules [65].

Accordingly, Levinthal and Marino [79] indicate that a firm needs to consider its adaptive mechanisms. Scholars indicate that these include a framework that considers learning and adaptation and the internal selection of specific behaviors and routines. In studying interrelationship among variation, selection, and plasticity, they note that it is essential to differentiate between the behavior foundation and the adaptation that emanates from this base [79]. These academics observe that selection prevails over espoused behavior [79]. They also describe the concept of plasticity, or the capability to adapt an individual's or firm's behaviors or routines [79]. These scholars observe that it poses a paradox for firms by offering adaptive learning; however, it may challenge and mitigate the selection processes that recognize ideal (or not) behaviors or routines [79].

The influence of behavioral theory and psychology

According to Argyris and Schon [7], behavioral theory plays a significant role in organizational learning. These scholars highlight that one of the most influential concepts in organizational learning involves the concept of learning from mistakes [7]. They provide a framework for learning at the individual, group, inter-group, and organizational levels [85].

Their significant contribution [86] to organizational learning involves the ideas of theory-of-action and theory-in-use. These concepts rationalize the split between an individual's espoused theory and real actions [85]. The stated or espoused theory can relate to organizational values, policy, or procedures, whereas the use or practice theory, or theory-in-use, refers to what individuals do to perform a function or solve a problem. Argyris [85] explains that individuals maintain mental maps that guide their actual behaviors rather than stated behavior. In essence, Argyris and Schon [7] observed a mismatch between what individuals advocate and what they use. Interestingly, these scholars noted that most of these individuals are not aware of these cognitions [7]. Further, they note that what individuals state can vary dramatically, yet what they use remains the same [85].

Argyris [85] adds that two implications emerge from these learnings. First, facilitating learning can be more attainable than thought, considering that theories-in-use are fewer within industrialized society [85]. The second is that learning can produce knowledge for individuals and firms to use [85].

To illustrate theory-in-use better, Figure 5 outlines a core construct that consists of three parts [86]. The first involves governing variables, which individuals try to maintain within acceptable boundaries [86]. The second

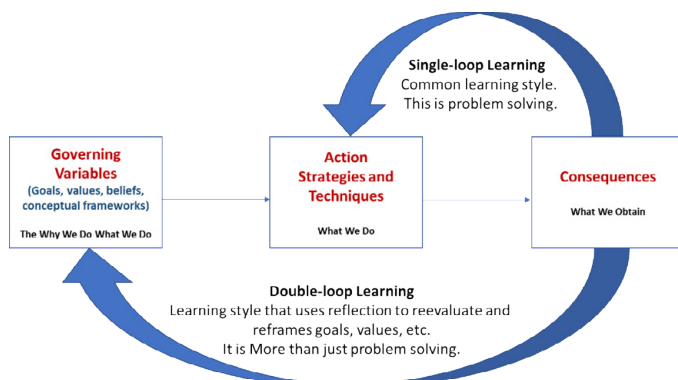


Figure 5. Core Construct for the "Theory-in-Use" Construct that Sets the Basis for Single- and Double-Loop Learning (Adapted, Argyris and Schon, 1974, 1978) [7,87].

considers action strategies that describe the plans and actions, which preserve their governing variables within acceptable boundaries [86]. The third are consequences, which include intended or unintended results of the action for one's self or others [86]. Thus, consequences that coincide with expectations confirm an individual's theory-in-use [86]. When they do not mesh, there is a mismatch between intent and outcome, which might require a course correction [86]. Further, when such a disconnect countervails the individual's governing values, this scenario requires reflection and the revisiting of the underlying governing variables or assumptions [86].

Thus, this model offered by Argyris and Schon [86] becomes the basis for single- and double-loop learning as each addresses the mismatch at different levels. Such actions involve the process of detecting and correcting errors [7]. These scholars explain that single-loop learning involves an "error detection and correction" process in which the firm does not need to change an overarching governing variable(s) (e.g., norms, practices, policies, strategies, or values) to correct the mismatch [7]. Alternatively, they describe that double-loop learning occurs when the correction requires the firm to reevaluate and address the governing variable(s) to correct such misalignment [7]. Such learning is essential for authentic learning and growth to occur within the firm [85].

Taking these concepts further, Argyris and Schon [7] describe two models to explain the processes and double-loop learning: Model 1 Theory-in-Use and Model 2 Theory-in-Use. They characterize Model 1 as consisting of four central tenants: (1) achieve intended purpose; (2) maximize winning while minimize losing; (3) suppress negative emotions; and (4) act consistent with what one considers rationale [85]. These apply to both the individual and the organization. Argyris [85] adds that Model 1 action strategies include advocating one's position, evaluating others' thoughts and actions (and one's own), controlling environment and task, protecting oneself and others, and attributing other causes for the outcome or mismatch. As multiple scholars observe, such leads to mechanisms that sacrifice one's governing variables that prevent inquiry and, more significantly, lead to many negative consequences, including defensive relationships, misunderstandings, low freedom of choice, low production of valid information, and little public testing of ideas [87,88]. Argyris [87] explains that defensive behaviors include policies or actions to obviate embarrassment or threat and to prevent the discovery of the root cause. He adds that such behavior impedes the double-loop learning process for both individuals and firms, which prevents a reassessment of governing variables or assumptions [87]. Further, Argyris and Schon [7] highlight two challenges to learning that involve reliance on Model 1 and defensive practices: (1) individual perception of competence, self-confidence, and self-respect are reliant on both practices, and (2) ingrained behaviors, without any self-awareness.

These scholars then characterize Model 2 Theory-in-Use [7]. Argyris [85] notes that much of Model 2 rests on double-loop learning. He elaborates that through the inquiry and modification of the governing values, an individual or organization can generate new action strategies to address the mismatch and changing conditions [85]. This scholar explains that the governing principles for Model 2 are the antithesis of those in Model 1 [85]. These values include valid data, free and informed choices, internal commitment, and detecting and correct errors, careful monitoring of such choices [85]. He and others espouse the approach to sharing control and participation in design and execution [87,88]. These guidelines underlie several operational practices to encourage success [87]. Such behaviors include (1) gaining others' views, rather than imposing one's own; (2) offering transparency and testing of theories; (3) opening reasoned positions supported by directly observable data for others to query and test; and (4) surfacing conflicting views [87,88]. Thus, as a result, Argyris [85] argues that Model 2 practices facilitate double-loop learning that will persist, enhance freedom of choice, engage the considerations of embarrassment and threat, and interrupt defensive routines at the individual, group, and organizational levels.

4Is learning framework for organizational renewal

A seminal piece of organizational learning literature involves the work of Crossan et al. [44]. This paper focuses on strategic renewal and a framework

to explain the process [44] (Figure 6). In this work, they outline four underlying premises grounded in prior organizational literature works [44].

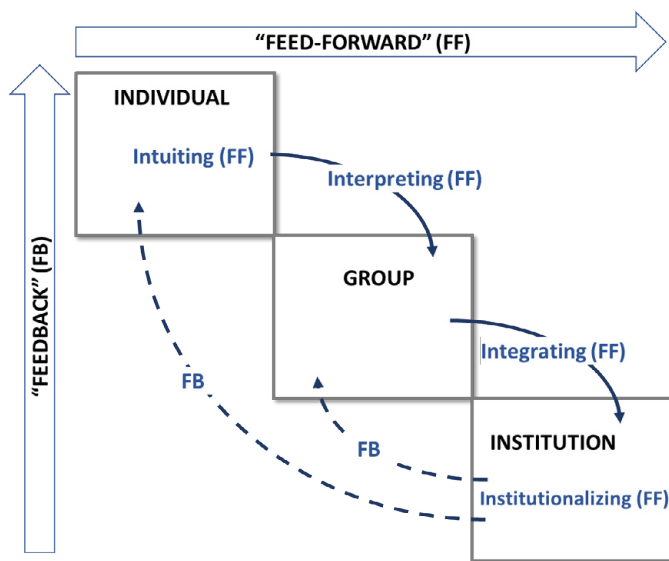


Figure 6. Crossan's 4I's Framework with "Feed-Forward" and "Feedback" Mechanisms that Reflect the Movement of Knowledge (and Its Byproducts) Up from the Individual to the Group to the Institution (Exploration) and in the Other Direction (Exploitation) (Adapted, Crossan, Lane and White, 1999) [44].

The first that Crossan et al. [44] propose considers the underlying tension between that of exploration (new learning) with exploitation (using knowledge learned). They note that a balance between these two facets is essential so a firm can both prosper and survive, yet the competition for attention and resources creates the tension between these two elements [8,44]. Their second highlights the multilevel framework of the firm individual, group, and organization [44]. Hence, learning transpires at each level and institutionalizes in the organization as embedded memory constructs (e.g., history, procedures, routines, structures, and strategies) [1,44,80]. Such an organizational learning process occurs due to the competition between exploratory and exploitive efforts that creates tensions throughout the firm, starting at the individual level and progressing through to the group and organizational levels [1].

Their third premise explores the psychological and social process linkages [44]. These scholars characterize these facets as the 4Is framework—intuiting, interpreting, integrating, and institutionalizing (Figure 6) [44]. They explain that these processes occur over the three organizational learning levels individual, group, and organizational [44]. The learning processes flow across these three levels firm [44].

Crossan and colleagues [44] characterize intuiting at the individual level. Such effects can occur within a group or organization [44]. They emphasize that it is a uniquely human process that occurs subconsciously [44]. Intuiting involves inputs that include experiences and images and the recognizing and discerning pattern similarities and differences [44]. It can be exploitive (i.e., expert intuition) or exploratory (i.e., entrepreneurial intuition) [44]. The environment may present such stimuli for such learning at this level [4]. These authors do identify the essential outputs as metaphors, which link insights to interpretation [44].

Concerning interpreting, Crossan and colleagues [44] characterize it as bridging the individual and group level. These scholars note that interpretation involves the refinement and development of insights [44]. They identify that metaphors mark the transition to interpretations and may be the basis for language and dialogue [44]. These authors note that this stage begins to pick up on conscious elements of the learning process and occurs in the context of a domain or environment, which provides a stimulus for learning [1,44]. These scholars note that cognitive maps and language play a significant role in guiding the interpretation process [44]. They note that language and conversations are essential parts of this process that

transcends both the individual (self-talk) and group (conversation) levels [44]. Thus, they characterize inputs as language and cognitive maps and outputs as conversation and dialogue [44].

The next level that these scholars discuss involves integrating [44]. However, these authors note that integrating happens primarily at the group level but links in with the organization [44]. They add that the prior process of interpretation dovetails into integration [44]. Here, Crossan and colleagues [44] explain that this process involves collective conversations and shared practices [44]. These authors note that it involves inputs, such as a shared understanding through dialogue and coordinated actions, through mutual adjustments [44]. They emphasize the importance of the surrounding context [44]. These scholars add that language plays a significant role in creating, maintain, and preserving learnings and knowledge via stories [44]. Such translates to outputs involving a shared understanding of the possibilities and interactions to achieve those aspirations [44].

Completing the framework, these scholars define institutionalization as an organizational-level process [44]. They describe how the organization, as a socially constructed body, institutionalizes what groups create as procedures and rules [44]. Such actions, they add, lead to the embedding of routines that permeate throughout the firm [44]. They note that institutionalization is different from the processes at the individual or group level [44]. These authors note that organizational learning is greater than the sum of individual learnings, leveraging these insights [44]. They emphasize that this level should realize and enjoy the benefits of individual and group level learnings [44]. To this end, the process involves the essential inputs of the routinization of actions and tasks, and organizational mechanisms and diagnostic systems [44]. It is from these inputs that rules and procedures emanate as outputs [44]. These tangible results are essential for strategic renewal [44].

Finally, their fourth considers the link between cognition and action (affecting each other) [44]. These authors observe that an organization cannot institutionalize all the ongoing individual learnings due to the time and process to transfer such across all the levels [44]. Further, they note that, within contextual and environmental changes, gaps can occur between existing practices and current needs [44]. Such deviations may provide a stimulus for learning [44]. Thus, a firm may stress more emphasis on individual and exploratory efforts [44]. Alternatively, there may be challenges in the firm in moving forward individual and group learnings, by both individual (e.g., communication and integration) and organizational constraints (e.g., ingrained routines or excessive emphasis on exploitation) [44]. Such results ultimately lead to strategic renewal [44].

To this end, these scholars characterize organized learning as a dynamic flow that embodies the entire learning cycle [44]. They posit that this dynamic is where the 4I's relate vis-à-vis two processes, "feed-forward" (up levels) and "feedback" (down levels) [44]. These authors explain that fundamental tensions exist between these two directions that involve the creating and accommodation of new learnings and knowledge ("feed-forward") and the exploitation of knowledge ("feedback"). Crossan et al. [44] particularly highlight two problematic relationships [44]. The first involves "feed-forward" in moving from interpreting to integrating. Here, this process encounters several individual challenges: communication, expression of cognitive maps, and the collective interpretation of such representations [44]. The second involves "feedback" from institutionalizing to intuiting, which can drive out intuition [44]. They also note that organizations can constrain the "feed-forward" dynamic flow with its inability to accommodate adequately and rapidly the new learnings [44].

Another intriguing extension of the 4Is model and strategic renewal involves work by Jones and Macpherson [89] in the small-to-medium enterprise setting (Figure 7). The scholars examine the internalization of the 4Is and the firm's engagement of external actors and organizations [89]. First, they identify the importance of inter-organizational relationships and owner/managers' proactiveness in utilizing them in the process [89]. Second, they discover the external partners' value in "intertwining" the knowledge [89]. Such efforts enable the firm to distribute and institutionalize learnings throughout the organization and embed more professional management

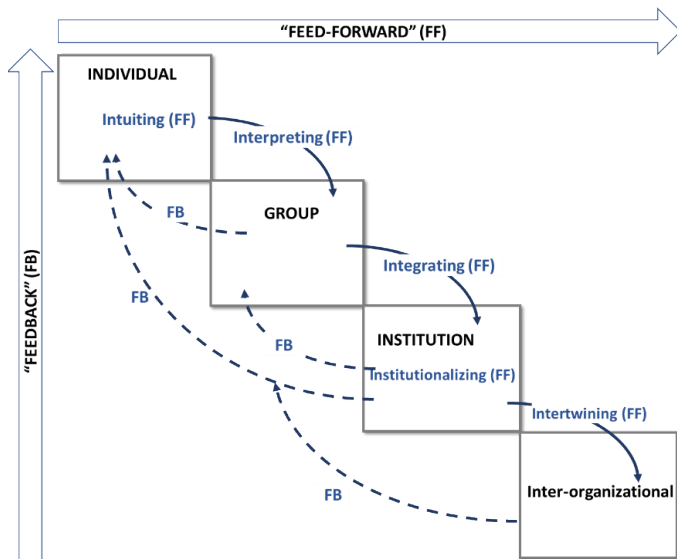


Figure 7. The Addition of “intertwining” to the 4I’s (5I’s Framework) (Adapted, Jones and Macpherson, 2006) [90].

practices [89]. Their work establishes how outside “knowledge providers” (e.g., customers, suppliers, and educational organizations) aid in the institutionalization of “new” knowledge [89]. Such interactions require the owner/manager to surrender some of their control so others can facilitate the process of knowledge acquisition, dissemination, storage, and use using both “feed-forward” and “feedback” mechanisms [89]. For example, they observe in their cases that such knowledge embeds in the firms' processes and systems to feedback to groups and individuals [89]

The notable contribution of this work by Jones and Macpherson [89] is their positing the concept of inter-organizational “intertwining,” a term that describes the active engagement with its external knowledge network, as an additional I to the model. Such examples of the knowledge network include customers, consultants, academics, suppliers, knowledge transfer partners, and regulatory specialists [89]. They highlight customer requirements, supplier suggestions, after-sales service, regulatory environment, and knowledge providers that provide valuable inputs from this network [89]. Finally, these scholars describe multiple outcomes clusters within several significant renewal activities, including (1) open-up, (2) exploring knowledge environment, (3) integrate and institutionalize knowledge, and (4) maintain/develop inter-organizational relations [89]. Specific examples include early problem recognition, creation of strategic or entrepreneurial space, recruitment of new expertise, staff training, engage staff in the change process, encourage direct knowledge providers, cede some control, outward-facing culture (exploratory) to tech and industry developments, and continuous scanning of the environment for threats and opportunities [89].

Crossan and Dutta, her graduate student at the time, add to this original work by extending it into the entrepreneurship space [1]. Specifically, they cross the literature streams involving organizational learning and entrepreneurship to examine several relevant phenomena [1]. In particular, they seek to reconcile the contrasting entrepreneurial ontological foundations (Schumpeterian and Kirznerian) and understand the evolution of opportunities via a complex learning process involving multiple stages and stakeholders [1]. Their approach employs the lens of organizational learning and, in particular, the 4I framework to resolve the conflicting perspectives discovery (recognition) and creation (enactment) around entrepreneurial opportunities [1].

These scholars uncover several relevant findings [1]. First, these scholars observe that the 4Is consider both the entrepreneurs’ dispositions to recognize possibilities and utilize day-to-day knowledge to discern these opportunities in an inimitable fashion [1]. Second, they see the 4Is as a process model that considers several “levels-of-analysis” and the entrepreneur’s progress through a learning process [1]. They added that this individual engages entrepreneurial opportunity and moves the idea through its life cycle across multiple levels within a firm and outside within the broader ecosystem [1].

Here, these scholars note that the entrepreneur can utilize prior learning and own cognitions to form ideas via intuiting [1]. They then outline how the entrepreneur transcends her/his ideas across a broader system that involves the influence of internal and external context and stakeholders [1]. The entrepreneurial firm considers the startup itself and its adjacent venture ecosystem, investors, and partners. For an established firm, such a journey involves an individual contributor (e.g., engineer, manager, scientist) with established organization groups, units, management levels, and the organization as engaged participants. Finally, these scholars explain that this transcendence involves moving through interpreting, integrating, and institutionalization processes [1].

Organizational Learning and Entrepreneurship

Diffusion of innovation

Multiple authors relate organizational learning and knowledge sharing (both intra- and inter-institutionally) to innovation, along with its diffusion, role in product development, business model development, and entrepreneurship [61,90-92]. Scholars offer multiple definitions of innovation [93-96]. These include a novel idea, a creation through a process, a construct, or an ingenious technological manifestation as a device, product, or methodology [93-96]. Maranville [92] characterizes it in the context of a more effective solution applied to meet existing or new needs or requirements (articulated or not). Baregheh [94] highlights that such diversity aligns with the business discipline paradigm describing this phenomenon and considers the definition to include its nature, type, stages, social context, means, and aim of innovation.

Of particular interest is the diffusion of innovations theory developed by Rogers and colleagues [97]. It explains the rationale, process, and rate for the dispersion of new knowledge (e.g., ideas) and knowledge byproducts (e.g., technologies, processes, practices) [11]. They argue that diffusion is a process in which participants within a social system adopt and communicate an idea or innovation [97]. These scholars posit four primary factors that influence the dispersion of the idea or innovation, channels for communication, time, and social system [97]. They add that dispersion depends significantly on human capital; the system's participants must widely adopt the idea or its byproduct to sustain the innovation [97]. As the system's adoption rate increases, these scholars continue, it achieves a point of critical mass [97].

To this end, Rogers and colleagues [97] characterize the progression of diffusion through two graphical presentations (Figure 8). In the first, they describes a bell curve to explain the adoption among various customer groups, from innovators to early adopters, early majority, late majority, and laggards defined on the X-axis [11]. For the second, these scholars outlines an S-shaped curve that overlays the bell curve with the same X-axis and a Y-axis to define market share [11].

Rogers et al. [11] explain that diffusion transpires over a period via communication channels among a social system’s participants. Such parties

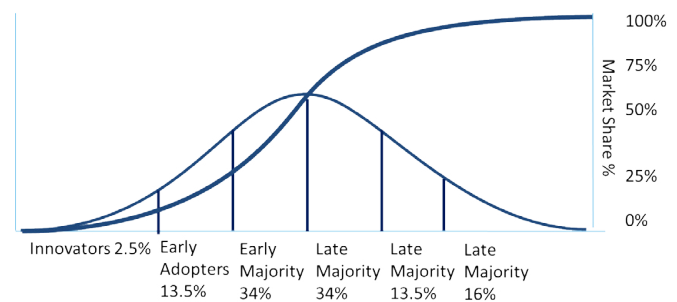


Figure 8. 4Is May Extend the Diffusion of Innovations Theory. Diffusion is a process in which participants within a social system adopt and communicate an idea or innovation (Adapted, Rogers et al., 1969). [98].

can include both individuals and a more complex system or an organization as participants [11,98]. He adds that it involves five-stages of decision-making: awareness, interest, evaluation, trial, and adoption (or knowledge, persuasion, decision, implementation, and confirmation) [11].

When examining the diffusion of innovations theory, one can see how organizational learning processes apply, in particular, the 4Is concept [44]. Scholars indicate that the process allows the knowledge (i.e., ideas) to disseminate from individuals to groups, organizations, and the environment (e.g., communities, economies, industries, networks, governments, trade groups) [44,98]. Such transference leads to new norms, policies, practices, routines, or standards [44]. Crossan and colleagues [44] explain that the tension for change (e.g., competition, economic conditions, performance, technological change) provides motivation. They add that the process facilitates an interplay among participants and groups in moving along an innovation or idea from individual to institution and beyond [1,44].

Other factors can facilitate diffusion within the firm. Gustafson and colleagues [99] note that a match (or fit) with the firm or environment is another critical consideration. They add that such occurs when a firm can assess an idea or innovation more effortlessly, go through less unplanned changes, and see that it will be adopted more likely [99]. Meyer and Goes [100] argue this perspective by noting where the spreading of an idea or innovations through the firm for any reason can facilitate its further diffusion. Further, Exworthy et al. [101] point to the support of various institutions, such as the government, that can facilitate the spread. Hence, organizational learning processes (from intuiting to interpreting, integrating, and institutionalizing) inform institutions that can facilitate the spread of ideas via economic development efforts, education initiatives, entrepreneurship incubator and accelerator programs, and innovation policies [1,44].

Role in opportunity recognition

Lumpkin and Lichtenstein [4] provide a contribution that connects organizational learning and opportunity recognition. In their *Entrepreneurial Theory and Practice* paper, these authors argue that organizational learning can enhance a startup’s opportunity recognition abilities and arm them better to pursue and enact promising ideas [4]. They explain that it will enhance a firm’s capabilities to discover and form new entrepreneurial avenues to create wealth and strategic advantage [4].

In their contribution, Lumpkin and Lichtenstein [4] discuss three critical learning modes: behavioral, cognitive, and action. They explain that these modes offer a framework that describes entrepreneurial firm learning processes [4]. First, they describe the behavioral capacity in the context of the firm’s response to their own and external organization’s experiences that facilitates changes in its embedded capabilities (e.g., practices, routines, systems, technologies) [4]. They note that firms embrace such changes as an adaptive process to poor market performance, competitive signal, or exogenous shock [4]. However, these scholars add that most behavioral learning tends to be incremental, as many take on a trial-and-error approach that fits with the consistency of the firm’s routines [4,102]. Second, these scholars discuss the aspects of the development and existence of individual and organization frameworks for knowing, known as cognitive maps [4].

They also expand the description to include “thought process” assets, and knowledge property and competency as part of a firm’s dynamic capability [4]. Third, they contrast the other modes with action learning capability [4]. Lumpkin and Lichtenstein [4] observe that this mode is in the moment, situates in nature, and corrects disparities between what a firm espouses and what it does [4]. They note that such involves “real-time” practices, including on-line reframing activities and single- and double-loop learning [4]. These authors indicate such practices lead to renewal and commitment to the updated engagement rules [4]. They note that it is a type of cognitive learning since it centers on beliefs and interactions based on the leadership’s cognitive schema [4].

These scholars then introduce a two-phase opportunity recognition (OpR) model (Figure 9) [4]. They describe these phases as that of (1) discovery (identification of a good idea) and (2) formation (transform it to add value and generate revenues) [4]. These scholars outline five essential stages of opportunity recognition: preparation, incubation, insight, evaluation, and elaboration [4].

Next, Lumpkin and Lichtenstein [4] integrate the three learning modes. First, these scholars relate the cognitive processes that occur in organizational learning and mental maps’ transformation to those during the discovery phase [4]. They draw on insights from the 4Is framework to explain cognitive insights that lead to novel connections, relationships, and possibilities [4]. Such learnings, they add, can transform ideas and assets into new knowledge, products, and businesses [4]. To this end, these scholars posit that a direct relationship between cognitive learning and efficacy in this phase [4]. They then describe the essential relationship between the behavioral model and the formation phase [4]. These scholars discuss the relevance of the evaluation and elaboration stages in developing the concept into an opportunity [4]. They elaborate on how this mode focuses on tangible outcomes, vis-a-vis learning-by-doing and trial-and-error learning processes [4]. These scholars explain that the process first starts with information dissemination to stakeholders for analysis [4]. These authors then add that the second involves experimentation to reframe and reorganize an idea [4]. These scholars note that the byproduct is a more adaptive firm with improved entrepreneurial processes [4]. They posit a direct relationship between behavioral learning processes and effectiveness in the formation phase [4]. Third, these scholars explain how the action mode provides a context for and a connection between the model’s two phases [4]. They note how it offers a competitive advantage by facilitating enhanced ingenuity, innovation, and fruitful interactions [4]. To these points, Lumpkin and Lichtenstein [4] posit a positive relationship between action learning and effectiveness in encouraging both phases of opportunity recognition. Hence, they summarize that firms can use these three modes to identify and construct novel and unforeseen entrepreneurial paths [4].

Lumpkin and Lichtenstein [4] close by highlighting the entrepreneur’s importance and the firm’s learning abilities to make this process viable. They propose two positive relationships between the degree of enactment of such practices by first the entrepreneur individually and second by their firms around the level of opportunities that each recognizes [4].

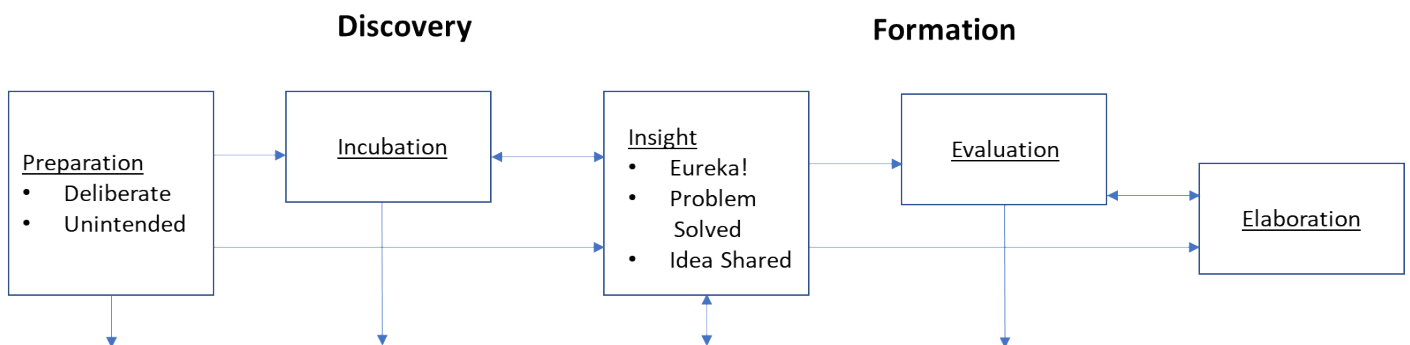


Figure 9. Opportunity Recognition Model (Adapted, Lumpkin, and Lichtenstein, 2005) [4].

The lean startup

The lean startup is a popular practitioner-based methodology that Eris Ries defines through his blog and bestselling book, "The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses" [12]. While the lean startup has no formal definition, it describes a hypothesis-driven, scientific approach in developing new products and businesses [11,12,103,104]. Its purpose is to help ventures navigate uncertainty and improve their odds of success rapidly and efficiently [12]. This methodology aims to mitigate the uncertainties that entrepreneurs face and identify scalable products and business models that resonate with customers. Its value proposition focuses on minimizing time and resources.

Essential components

The lean startup process centers around five core principles: (1) entrepreneurs are ubiquitous; (2) entrepreneurship is management; (3) validate learning; (4) build-measure-learn; and (5) innovation accounting [12]. From these principles emanate the following components [11,12].

The process begins with an entrepreneurial vision (Figure 10), which defines the venture's focus and involves ideation [11,12]. The next step involves translating falsifiable hypotheses around a product/service and business model [2,11,105].

Eisenmann et al. [11] highlight the centerpiece to the methodology as experimentation, which flows from the setting of hypotheses. Experimentation

embraces the scientific approach (Popperian approach) using a "build-measure-learn" (BML) cycle to test hypotheses [11,59,106]. Such a process reflects facets of Deming's "plan-do-check-act" [107] and Boyd's "observe-orient-decide-act cycles" [108].

This testing cycle involves a minimum viable product (MVP) [11,59,106] and a business model [2,105]. According to Moogk [109], the MVP (Figure 11) describes a product consisting of a "bare-bones" set of features and capabilities to measure market traction and to reach early customers. Ries [12] explains that the MVP is a product sufficient to drive one BML cycle turn with minimal effort and time to validate learning. Eisenmann et al. [11] indicate that enables a firm to reach early customers to gain direct feedback [11].

According to Blank [2,105], a part of the experimentation process is customer discovery (Figure 12). Customer discovery involves a search process that employs direct customer interviews and a business model canvas to understand needs, the "job to do," and test hypotheses around business model assumptions using the canvas and the product via the MVP [2,110-112]. This author explains that customer discovery employs direct interviews to identify the customer, his/her needs, and test (and validate) MVP and business model assumptions [105]. It enables a firm to reach early customers to gain direct feedback [11]. The experimentation process's final part engages measurement [12,113]. This component involves a metric-based evaluation with actionable quantitative metrics with defined thresholds to test hypotheses, measure progress, and validate learning [12,113,114].

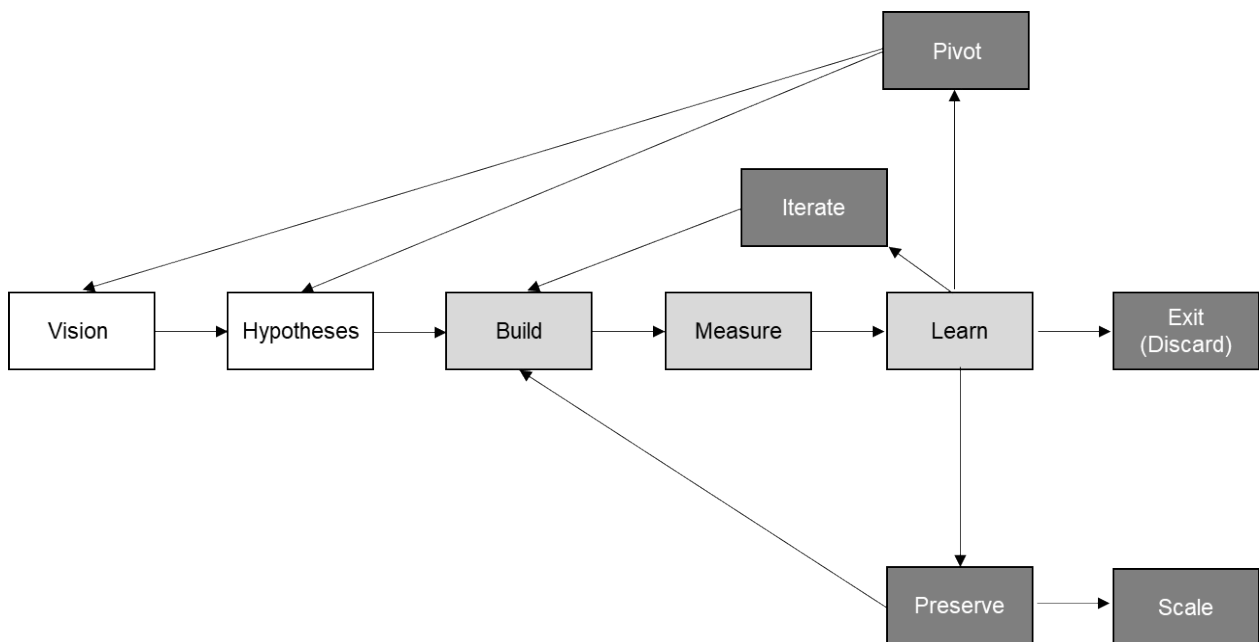


Figure 10. Lean Startup's BML Cycle and Learning Actions (Light Gray: BML, Dark Gray: Resultant Learning Actions) (Adapted, Bortolini et al., 2018; Eisenmann, Ries and Dillard, 2011) [11,103].



Figure 11. Example MVP Dropbox (Cleevio.com, 2020) (Adapted, <https://www.cleevio.com/blog/6-how-to-build-an-mvp-in-agile>).

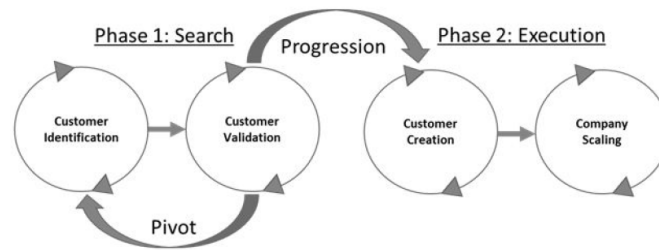


Figure 12. Blank's Customer Discovery Search and Execution (Adapted, York from Blank, 2013 and York, 2018) [2].

Eisenmann et al. and Ries [11,12] highlight the next significant step invalidated learning. This step engages the reflection on experiment results (hypothesis de/confirmation) and considers resultant actions (pivot, iterate, move forward, or exit) [11,12]. They explain that iterations reflect minor changes, and pivots involve substantial corrections around the MVP and/or business model [2,105]. These two actions characterize lean startup as an adaptive strategy [103,115].

The experiments' outcomes and the ability to validate product traction and a sustainable business model lead to a state of product/market fit (P/MF) [11,105]. Entrepreneurs, investors, and scholars characterize P/MF as a representation of (1) the right product for the market with a demonstrated early-adopter demand and attractive market potential; or (2) a good market with a product that can satisfy the space in a rapid, efficient, and cost-effective manner [11,110,116]

Antecedents

The lean startup emanates from several antecedents. The most notable is lean manufacturing [72,73,117,118]. This process centers on efficiency and the minimization of waste [73]. Several scholars note that it provides feedback-based learning through experimentation, rapid iteration, small batches, short cycles, and a minimum viable product to improve processes [11,119].

Two other foundational concepts emerge from the product development literature [120-122]. The first involves McGrath and MacMillan's [121] work that defines discovery-driven planning, an approach that promotes plan adaptation for uncertain areas as the firm obtains new information (e.g., market, partners, competitor, or internal). McGrath [122] extends it into an entrepreneurial business model innovation [122]. The second concept, proposed by Lynn and colleagues, is "probe and learn." This effort relies on feedback to reinforce success-based actions and avoid failure-based ones [120].

Another important antecedent is the work by Sull [123] that describes the idea of disciplined entrepreneurship. He explains that this concept highlights the critical challenge of managing uncertainty inherent with the entrepreneurial experience [123]. This scholar notes that it emphasizes formulating hypotheses, staging experiments, and iterating based on such tests [123].

Organizational learning roots and scientific support

Multiple organizational learning concepts (many of which this paper has previously discussed in detail) appear to provide a supportive foundation to the lean startup methodology. First, experimentation, a type of exploratory learning, is a subprocess of experience within the knowledge acquisition construct for organizational learning [3,15,102]. The second involves the single- and double-loop learning processes, which tie into feedback and realignment when set activities miss aspirations [7,124]. The third is the 4I's framework (intuiting, interpreting, integrating, and institutionalize) to facilitate strategic renewal and competitive advantage, with its "feed-forward" and "feedback" mechanisms to routinize learning from the individual to the group to the organization [44]. This work extends into the entrepreneurship space [1].

Furthermore, the concept of dynamic capabilities from Teece et al. [45] represents a type of organizational learning process. This concept describes

a firm's ability to integrate, build, and reconfigure internal and external competencies to address a rapidly-changing environment and provide for competitive advantage [45]. According to Ladd et al. [13], these abilities guide the entrepreneur, who collects, interprets, and absorbs new information, then reconfigures resources and strategies to improve the probability of success. Teece [46] elaborates that dynamic capabilities combined with a strategy can influence a defensible business model's development. Such occurs as the organization progresses from sensing opportunities to seizing a construct to transforming the organization [46].

Publications in the literature provide support around the organizational learning underpinnings [5,103]. Bortolini et al. [103] provide a historical literature review that discusses how the lean startup's principles, methods, and practices overlap with the Learning School of Strategy. Ladd et al. [13] illustrate in their work involving a cleantech accelerator study of how experimentation can lead to emergent and repeatable learning routines. Finally, Mansoori [5], examining entrepreneurial ventures in a Swedish prescriptive accelerator, uses Argyris and Schon's theory-in-use model [7] to examine how entrepreneurs acquire, internalize, and practice lean startup methods vis-à-vis experiential and vicarious learning processes.

Finally, Frederiksen and Brem, evaluate the antecedent literature to assess lean startup's foundational support [104]. Based on their analysis, these scholars rate the evidence as follows: (1) user and customer involvement in product or business development (very strong); (2) iterative new product development and effectual thinking (strong); and (3) experimentation in new product development and early prototyping (e.g., MVP) (medium) [104].

Evaluating the impact of the lean startup from an organizational learning perspective

Most management discussions pose a fundamental question in determining a strategy's viability— does it make an impact? Hence, one clear opportunity that exists in the literature is to assess the impact (the organizational and performance effects that occur within the startup) of lean startup, using the lens of OL and constructs such as Crossan's 4I's [44].

The term impact involves multiple characterizations. The Merriam Webster Dictionary defines it as a force of impression of one thing on another, or a significant or major effect [125]. In the literature, the definition can involve an economic [126,127]; environmental [128]; societal [129]; organizational [127,130]; or technological connotation [127]. For example, one common definition involves the long-term changes (positive/negative, primary/secondary, direct/indirect, intended/unintended) that occur during and/or after a project and beyond the target group [131]. Other descriptions consider the term as (1) the portion of the outcome (above and beyond what would have occurred) due to a venture's activity [132]; (2) the change at the level of the target group [132]; (3) the same as the outcome [133]; (4) the perception of improved decision making, organizational communication, business process rationalization, customer satisfaction, cost reduction, and the firm's overall productivity and performance [130]; and (5) the risks and benefits that the inferred knowledge exert on an information producer [134]. Specific to this research endeavor, the last four definitions (2-5) resonate concerning the impact (collectively defined as to the organizational and performance effects that occur within the startup) of the lean startup methodology.

In considering the organizational learning literature, the work of Crossan et al. [44], utilizing the 4I's framework (intuiting, interpreting, integrating,

and institutionalizing) and its “feed-forward”/“feedback” process, offers a unique lens with which to examine the impact of the lean startup within the entrepreneurial space. Dutta and Crossan [1] extend this work into entrepreneurship, seeing that the entrepreneur can intuit, and then “feed-forward” through three Is both within the firm and across the broader ecosystem of customers, partners, and investors to “feedback” on as they embrace new ideas, knowledge, and their byproducts. These authors posit several propositions [1] but fail to test them empirically (personal communication D. Dutta).

Multiple arguments support the organizational learning direction using the 4I's. First, little work exists concerning the lean startup using the lens of organizational learning. A qualitative study by Mansoori (2017), using Argyris and Schoen's Model 2 theory-in-use, provides insight that utilizes an organizational learning lens to evaluate the lean startup. Further, Bojovic et al. [56] highlight the multiple roles of experimentation as part of the business model innovation process. Second, no study exists that engages the 4Is in the business model innovation role. Third, no study reflects the testing of propositions that Dutta and Crossan [1] posit, making this area an excellent contribution area. Fourth, multiple scholars and consultants report that one of the challenges in using the lean startup involves the founder and the founding team's alignment concerning what experiments to run and how to interpret results [89,117,135]. Fifth, such work could address the fifth I, “intertwining” [89], which characterizes the startup's external community interactions. Finally, such research can extend into Teece's stages of sensing, seizing, and transforming in the business model innovation process [46] and Roger's diffusion of innovation theory [97].

Lean startup organizational learnings research questions and propositions to explore

Rigorous research begins with an overarching research question around the impact of the lean startup practices in an entrepreneurial venture and the lens from which to view this dynamic. In this case, lean startup practices include customer discovery, experimentation, validated learning, business model innovation/validation, and product validation. Further, this question specifically defines impact as the organizational and performance effects that occur within the startup.

- How do entrepreneurs view the impact of using lean startup practices in advancing their product and business model innovations: an organizational learning perspective?

This question leads to the following propositions:

P1: Entrepreneurs using lean startup practices will hold a favorable view of the impact of using lean startup practices in advancing their product and business model innovations within their firms.

P2: Entrepreneurs using lean startup practices will hold a favorable view of the impact of using lean startup practices in advancing their product and business model innovations within their adjacent external entrepreneurial venture ecosystems (EVE).

Several sub-queries help to refine this core inquiry, focusing on several specific areas:

- What is the impact of using the lean startup practices on an entrepreneurial venture's founder (and startup team's) effectiveness in the “feed-forward” of one's (its) ideas, from intuiting to institutionalizing, to legitimate the venture's business innovations (products) and models at the firm and external entrepreneurial venture ecosystem levels? In this case, the EVE includes customers, partners, investors, and regulators.

This question leads to the following propositions:

P3: The use of startup practices will favorably impact the “feed-forward” process in advancing their product and business model innovations within their firm.

P4: The use of startup practices will favorably impact the “feed-forward” process in advancing their product and business model innovations within

their adjacent external EVE.

- How does an entrepreneurial venture assess the impact of lean startup practices at each “feed-forward” stage in advancing its business innovations (products) and models towards legitimate and sustainable versions at the firm and EVE levels? How do such firms compare with those who do not use some type of assessment mechanism?

These questions lead to the following propositions:

P5: Entrepreneurial ventures using lean startup practices are more apt to use some metric to evaluate the methodology's impact on the “feed-forward” will more successfully advance their innovative products and business models within their firms.

P6: Entrepreneurial ventures using lean startup practices are more apt to use some measure to evaluate the methodology's impact on the “feed-forward” will more successfully advance their innovative products and business models more effectively in their external EVE.

P7: Entrepreneurial ventures using lean startup practices using clear definable metrics to measure the impact of the methodology on the “feed-forward” will more successfully advance their innovative products and business models more effectively within their firms than those who do not.

P8: Entrepreneurial ventures using lean startup practices using clear definable metrics to measure the impact of the methodology on the “feed-forward” will more successfully advance their innovative products and business models more effectively in their external EVE than those who do not.

- What is the influence of endogenous and exogenous contextual factors on the lean startup practices' impact on the “feed-forward” process of an entrepreneurial ventures' business innovations (products) and models within the firm and its EVE? In this case, endogenous contextual factors include the founder, team, and leadership's traits, intent, and experience. Exogenous factors include the environment, competition, the sector, and investment capacity within the community.

This query leads to the following propositions:

P9: Endogenous factors in entrepreneurial ventures using lean startup practices will exert a modifying effect on the ability to “feed-forward” an innovation or business model within the firm.

P10: Endogenous factors in entrepreneurial ventures using lean startup practices will exert a modifying effect on the ability to “feed-forward” an innovation or business model within the external EVE.

P11: Endogenous factors in entrepreneurial ventures using lean startup practices will exert a modifying effect on the ability to “feed-forward” an innovation or business model within the firm.

P12: Endogenous factors in entrepreneurial ventures using lean startup practices will exert a modifying effect on the ability to “feed-forward” an innovation or business model within the external EVE.

- What role do the entrepreneurial venture's and EVE's “feedback” processes play in exploiting its innovation (product) and business model once's the “feed-forward” process has realized a legitimized and sustainable version of each in firms using the lean startup process? How do they compare vs. firms that do not?

These questions lead to the following propositions:

P13: Entrepreneurial ventures using lean startup practices are more apt to use some type of “feedback” process in advancing their innovative products and business models within their firms?

P14: Entrepreneurial ventures using lean startup practices are more apt to use some type of “feedback” process in advancing their innovative products and business models within their external venture ecosystem?

P15: Entrepreneurial ventures using lean startup practices using some type of “feedback” process will more successfully advancing their innovative

products and business models within their firms than those who do not?

P16: Entrepreneurial ventures using lean startup practices using some type of “feedback” process will more successfully advancing their innovative products and business models within the external EVE than those who do not?

• What role does an entrepreneurial venture “feed-forward” and “feedback processes” play on its embedding and exploiting, respectively, of lean startup practices as standard routines within the firm’s commercialization process? How will they compare with firms that do not?

These questions lead to the following propositions:

P17: Entrepreneurial ventures that employ lean startup practices as a standard routine and use the “feed-forward” and “feedback” process will more successfully embed and exploit their innovative products and business models within their firms than those who do not?

P18: Entrepreneurial ventures that employ lean startup practices as a standard routine and use the “feed-forward” and “feedback” process will more successfully embed and exploit their innovative products and business models, translating to advancing their innovations and ventures within their EVE than those who do not?

Working Model

A working model (Figure 13) describes the dynamic of an entrepreneurial venture using the lean startup practices to aid the founder and startup team to “feed-forward” their ideas and knowledge to a sustainable product and business model. It considers this progression both at the firm and at the external ecosystem level. This depiction draws from constructs such as the modified stage-gate/agile enterprise model by Belkhir [136], the business plans and venture performance relationship that considers internal and selection effects by Burke et al. [136], and the multiple roles of experimentation offered by Bojovic et al. [56].

This model consists of the three organizational stakeholders involved with the process (individual, group, and institution) and overlays the 4I’s (intuiting, interpreting, integrating, and institutionalizing). The first phase of exploration and discovery involves the intuiting efforts (1) by the founder (or founding team) and the use of the lean startup practices to engage EVE participants, most notably the customer, to gather insights from customer development efforts (e.g., interviews, advisory boards) and in-market experiments (e.g., sign-up for clinical trials, patient recruitment). Such interaction leads to acquired insights and knowledge that allow for developing and testing hypotheses associated with the nascent MVP and minimum viable business model. These efforts occur primarily at the firm level but begin to engage and signal external venture ecosystem actors of the firm’s intent. This phase then transitions to the second stage of refinement, where the individuals responsible for intuiting shares the learnings from the initial lean startup practices of exploration and testing with the group (the startup team) to interpret (2) and integrate (3) these learnings relative to the product and business model. These stages engage the firm primarily and actors (e.g., partners, investors, regulators) within the external venture ecosystem to interpret and integrate knowledge that the firm shares with these participants. At this level, the group then continues the engagement process with the EVE, particularly customers, to refine the product and business model via further exploration and testing of updated hypotheses. The learning outputs from this round of exploration and testing feed into the interpreting and integrating stages. The insights gained lead to a refined product and business model at the group level. They also facilitate additional exploration and testing. Learnings from these phases feed into interpreting (2), integrating (3), and ultimately, the institutionalizing (4) stages. Actors within the enterprise pass along new knowledge internally, and outside partners (participants) within the external venture ecosystem engage with the firm’s discovery and validation processes externally.

This testing and exploration process continues until the startup team arrives at a sustainable product and business model at the institutional level based on customer and other EVE actor feedback. Here the organization

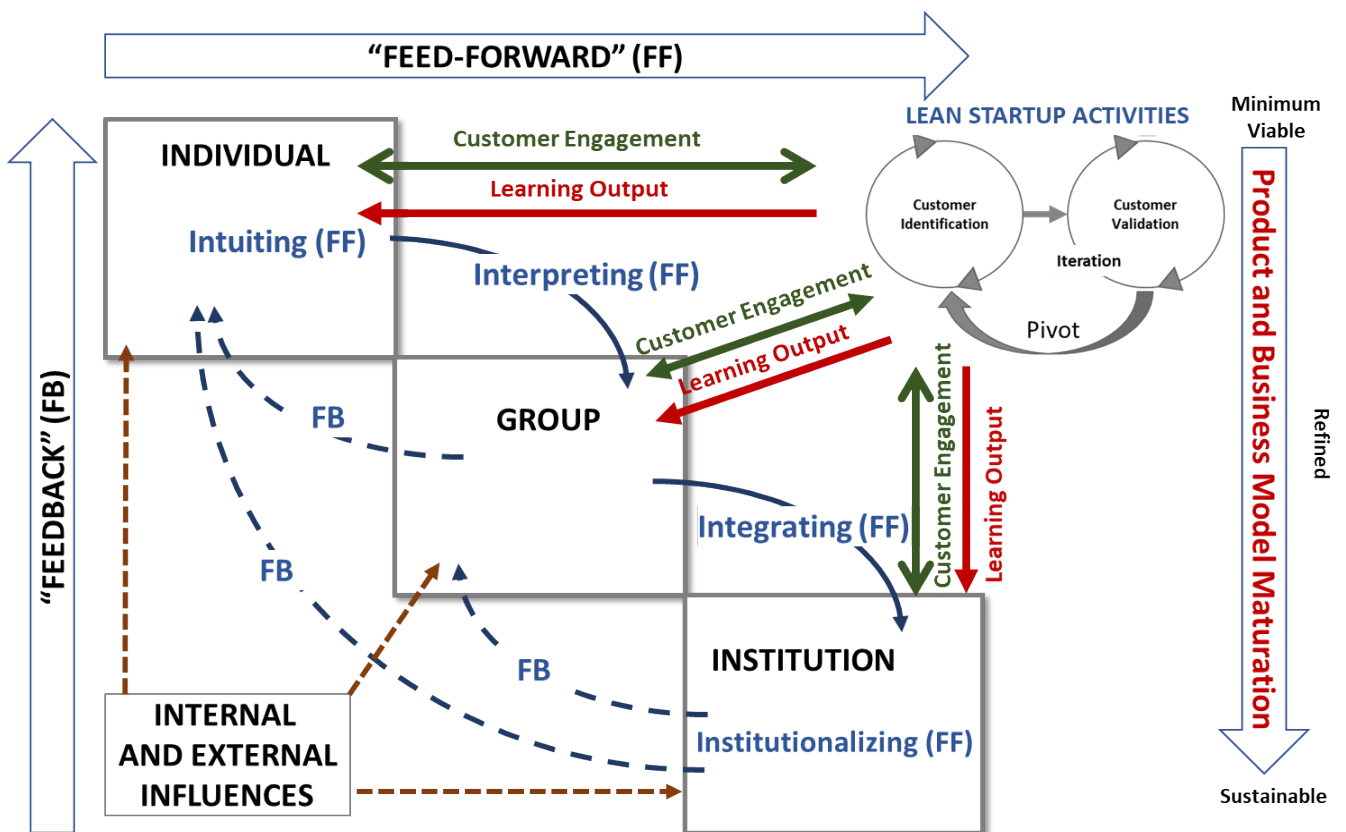


Figure 13. “Feed-Forward” and “Feedback” Processes within the Startup Using Engagement/Learning (“Intertwining”) with Customers and Other Actors in the External Venture Ecosystem.

embeds the knowledge around product and business model that the team (or group) “feeds-forward.” However, the “feedback” process occurs as the venture engages the new insights gathered from lean startup activities. This “feedback” process can occur from the group level when the individual advances new knowledge for interpreting, within the group when integrating the insights gained, and from the institution to the group and the individual as this level engages and institutionalizes new learnings around the product and business model that facilitates their maturation. The “feedback” countervails the “feed-forward” process. This interaction between the two forces produces a tension that ultimately translates to the embedding of new knowledge that the firm has tested and legitimized, leading to a more mature, sustainable product and business model.

Hence, the knowledge gained ends up embedding into set routines, policies, and strategies around the sustainable business model and product that the firm wishes to scale. The venture embraces and shares this knowledge and its end products at the organizational level. Depending on the degree of external engagement and “buy-in” at the interpreting and integrating levels, the new venture should realize the ingrainings of this knowledge and end products in the form of its embracing of a sustainable product and business model at the EVE level. In its experimenting processes using lean startup practices, the firm enacts the learning, signaling, and convincing roles with customers and other EVE actors. Hence, customer and other EVE actor feedback and engagement will signal to the firm that it has both a product and a business model ready to scale in an attractive market. If such occurs, then the firm should achieve a state of P/MF.

Finally, the other noteworthy piece of the model involves the influence of contextual factors. These include both endogenous and exogenous influences that can influence each stage. Hence, the model needs to account for these considerations. In intuiting, the founder traits and intention (related to the lean startup practices) are critical. Also, the business sector, environment, customer makeup, and adjacency of investment are external factors. Moving to interpreting and integrating stages, the traits, intent (related to lean startup practice use), and cohesiveness of the startup team represent additional internal factors to consider in the model, and the previously mentioned founder and external environmental influences. Finally, in transcending to the institutionalizing stage, the model needs to integrate the influences of the traits, intent (related to the lean startup practices), and cohesiveness of the executive team and board, along with the previously identified factors.

Contributions

This discussion closes by highlighting potential contributions to theory and practice that this work would offer.

Theoretical contributions

The most noteworthy contribution involves that to the theoretical foundation for the lean startup. Scholars cite issues with the lean startup's foundation because it is a practitioner-driven methodology [103,114,138]. Such contributes to the chasm between academics and practitioners concerning the legitimacy of the methodology [114,138].

Interestingly, others recognize the contribution of organizational learning to the lean startup [3,5,117]. The lean startup contains many organizational elements, including experiential learning, experimentation, and theory-in-use constructs such as double- and single-loop learning [7,15,56]. Mansoori [5] employs the lens of Argyris and Schon's [7] theory-in-use construct in evaluating experiential and vicarious learning process using the lean startup in a prescriptive accelerator.

However, organizational learning offers a unique opportunity to examine the lean startup's impact in advancing an idea or innovation within an organization, such as an entrepreneurial venture, and beyond in the EVE utilizing the 4I's framework [1,44]. Interestingly, Crossan and colleagues [44] recognize that the framework fails to fulfill theory criteria, resulting from limited empirical testing. Also, Dutta confirms (personal communication 2020) that no empirical testing exists concerning the six propositions from his and Crossan's 2005 paper. Hence, this effort involving the lean startup and

the 4Is represents a tremendous opportunity to add to both the lean startup's theoretical foundation and organizational learning's theory base concerning the 4Is by extending the works of Crossan et al. and Dutta and Crossan [139,44]. To this end, the model that describes the relationship of the lean startup activities, along with endogenous and exogenous influences, on the “feed-forward” process provides a valuable contribution to the lean startup and organizational learning theory.

Practice contributions

For practice, this research area presents multiple opportunities to add value. The most significant relate to addressing the question of impact within the entrepreneurial venture and beyond the ecosystem. Current contributions provide mixed findings [13,140-142]. None examine the impact within the firm and the broader ecosystem in advancing an idea or innovation.

The second involves the dynamics within the firm and beyond into the venture ecosystem. Scholars [117,143] and consultants [135] recognize that issues exist with startup teams and their mentors. This work situates well to examine such considerations to dissect the inter- and intra-firm dynamics in gathering external inputs and conducting experiments to shape the MVP and innovate a minimum business model to sustainable end products using the lean startup and customer discovery practices. Furthermore, this work considers the influence of endogenous and exogenous contextual factors and their relative influences. Such work can translate to useful tools for entrepreneurs and insights for their coaches to guide (and optimize) this process within the firm and the venture ecosystem. It also would consider endogenous and exogenous influences on the impact that the lean startup exerts on the “feed-forward” process. One such example can be a business model scorecard set out on a Likert-scale with defined anchors building on work that Teece [51] and Mateu and March-Chorda [144]. The other involves utilizing the model to create either an Internet-based software tool for entrepreneurial ventures and their coaches (e.g., teachers, mentors, program leaders) to monitor and guide their progress.

Further, Harms and colleagues (2015) observe that materials and technological-based ventures need to modify lean startup methods significantly to accommodate use in such settings. Investigation within the early-stage life-science represents a unique practice contribution using the institution of science- or product-driven orientation and the influence of the lean startup and customer discovery to shape the trajectory of the “feed-forward” process within this setting. This work can lead to tools and educational efforts fashioned for this setting to guide and gauge progress in using the lean startup in the “feed-forward” process. Such contributions could offer an incredible value add to co-working centers.

The final practice contribution relates to identifying the limits of the lean startup in practice. Both York [145] and Harms and colleagues (2015) recognize that boundaries exist using this methodology. The question is whether these boundaries are specific to the methodology, its use, or its settings. Camuffo et al. [140] report that the lean startup's rigorous use translates to a more significant impact in internet-based application and commerce firms. These researchers [140] find that those using the more rigorous approach experienced significant benefits ($p < 0.05$) in discarding ideas early (i.e., exits), pivoting on business concepts and products, and timing to reach revenue [140]. Future work using the lens of organizational learning can help clarify the optimal settings for use and practices to optimize the lean startup's impact. It can help to extend the observations from this group from Bocconi in Milan.

Conclusion

Organizational learning represents a broad and diverse field that draws on influences from multiple disciplines, particularly business management, psychology, philosophy, and sociology [1]. Diverse definitions exist around organizational learning as they address various aspects of the concept [15,16,18,22]. In many ways, organizational learning involves a dynamic process in which a firm acquires (from within or outside sources), embeds,

transfers, and exploits knowledge [15,18]. Such allows for the creation and capture of value, including financial returns, business growth opportunities, and organizational benefits (e.g., cultural, governance, and efficiencies) [15]. Furthermore, through this process, a firm gathers experience that aid uses to create new knowledge that the firm can share with other organization units. The construct involves multiple learning subprocesses, including congenital, experiential, and vicarious learning, grafting, and search and noticing [15].

Organizational learning engages several other considerations. It is essential to recognize that a firm develops knowledge and learns at multiple levels: individual, group, intra-organizational, and inter-organizational [24]. It also considers process improvement and expansion into new spaces by developing new knowledge and understandings and identifying and correcting misalignments via single-loop learning and organization governing values via double-loop learning [4,7]. Further, it recognizes that contextual factors influence the learning process, including organizational culture, firm structure, strategic attitude, and complexity of internal and external environments [16]. Finally, organizational learning represents a dynamic capability essential to gaining and maintaining a competitive advantage [45]. To this end, it influences, along with strategy, the process of sensing, seizing, and transforming knowledge (and opportunities) into the innovation of products and, in particular, the firm's business model [46].

The organizational learning literature focuses on areas that exist within more of a traditional organizational setting. However, multiple organizational learning concepts apply to the entrepreneurial venture. This paper explores three provocative questions specific to organizational learning and entrepreneurial ventures: (1) what areas of organization learning provide an underlying foundation for entrepreneurial ventures in exploring and advancing their innovations; (2) what areas within entrepreneurship embrace organizational learning concepts; and (3) how does organizational learning support the hypothesis-driven methodology seen with the lean startup.

One can apply these concepts and constructs to the entrepreneurial venture. Such firms tend to focus on exploratory activities, such as searching and validating customer needs, markets, P/MF, and business models. Multiple contributions exist within the literature that extend organizational learning foundational concepts into the entrepreneurship space [1,3-6]. In many ways, entrepreneurship activity is an ongoing learning process- from customers to suppliers to partners of what to do and what not to do [6].

Considering this point, one can recognize that multiple organizational learning processes apply. This paper examines several areas that one can apply to the entrepreneurial venture process. These include the concepts of ambidexterity involving exploration versus exploitation, and the practices of experimentation [8,9], distant search [4], learning from failure [74], and adaptation [65]. Notable is the influence of behavioral theory and psychology, particularly Argyris and Schon's single- and double-loop learning processes [7]. Finally, there is the 4Is learning framework for organizational renewal [44]. Inherent to the 4Is is the "feed-forward" and "feedback" dynamic that occurs both in the firm and between the firm and its local entrepreneurial venture ecosystem [1]. This dynamic emulates Rogers' diffusion of innovation theory [10,97].

The lean startup is a recent entrepreneurship methodology that is extremely popular in practitioner and academic circles. This hypothesis-driven approach uses a BML cycle to test an MVP and business model assumptions [11,12]. These scientific efforts translate to validated learning in which entrepreneurs discard, iterate, pivot, or persevere their ideas. The validated learning methodology draws on Argyris and Schon's theory-in-use and double-loop learning processes [143]. In many ways, this methodology and learning process aid entrepreneurs in their ability to "feed-forward" their innovations based on data to reduce uncertainties around the opportunity and market, and improve their ability to scale their new product and business model. Some scholars, such as Ladd and colleagues [13], consider lean startup practices a dynamic capability to aid the startup's competitive position. Other academics, such as Contigiani and Leventhal [3], situate lean startup within the organizational learning domain. They suggest that researchers use this lens to pose questions and move forward with a research agenda [3]. Hence,

organizational learning offers an excellent lens to explore the impact of the lean startup methodology.

Of interest relative to lean startup and organizational learning is how an entrepreneurial venture uses the knowledge gained through the scientific method and validated learning. Such efforts are essential for the firm to "feed-forward" its innovative products and business models while responding to within firm and outside-of-firm "feedback." This dynamic ultimately leads to a product and business model to exploit and scales. Considering this dynamic, one can surmise that the lean startup methodology and process reflect the overall tenants of organizational learning: acquisition, embedding, transference (distribution), and exploitation of new knowledge. Using the lens of organizational learning and the 4I's framework to examine the impact of "feed-forward" and "feedback" to explore the individual, organizational, and performance impact of the methodology

Thus, this paper ends with a new beginning. Multiple questions, along with the propositions emerging from them, establish the foundation for evaluating the lean startup and its impact from an organizational learning perspective. It starts with an overarching question of how entrepreneurs and ventures using lean startup view the impact on the organizational learning journey and its outputs. The sub-questions delve into more specific areas, including the impact on effectiveness at each "feed-forward" stage of the 4Is, how firms assess impact, the influence of endogenous and exogenous contextual factors, the role of "feedback" by the firm and venture ecosystem, and the role of these processes in embedding and exploiting innovative products and business models. Such queries consider the lean startup's impact in firms using the methodology and firms not using the methodology when considering these organizational learning questions. Furthermore, one can explore these questions via a proposed model that integrates lean startup practices situated within the construct of the 4I's model that considers the "feed-forward" and "feedback" processes and the influence of endogenous and exogenous influences.

The next phase will involve refining the proposed questions, propositions, and model that considers the 4I's, the lean startup activities, and confounding influences. These efforts will define the appropriate exploratory methods, followed by those to shape the defined hypotheses and tests of their validity. This journey continues in its search to contribute to the lean startup and organizational learning literature that will add value to the overall conversation. Such dialogue will help to bridge the chasm that exists between academics and practitioners concerning the lean startup. Thus, the exploration of the impact of the lean startup methodology, via the organizational learning lens of the 4I's and its "feed-forward" and "feedback" processes (both within the entrepreneurial venture and beyond within its adjacent venture ecosystem), can offer fascinating contributions to the entrepreneurship, organizational learning, and strategy literature.

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