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Field Experiments in Entrepreneurship and Innovation

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Entrepreneurship and innovation are pivotal drivers of economic growth and societal progress, yet they are inherently risky endeavors. This chapter explores the role of field experiments in understanding and improving these risky processes, bridging the gap between controlled studies and real-world complexities. Through a critical review of existing literature, we show how field experiments advance our understanding of entrepreneurship and innovation, and contribute to mitigating key frictions in these areas. Organized into frameworks, we categorize existing studies to facilitate systematic understanding and identify opportunities for future research. paving the way for more effective strategies and interventions in these critical domains. We also draw on our experience to discuss practical considerations in designing and implementing field experiments, offering insights often overlooked in experimental articles.

Keywords: Field Experiments; Literature Review; Entrepreneurship; Innovation

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1 Introduction

Entrepreneurship and innovation play crucial roles in both emerging and advanced economies (Baumol and Strom, 2007; Van Praag et al., 2007; Lerner, 2012). Individuals engaged in innovation - whether from academic institutions, established companies, or startups generate groundbreaking ideas that can serve as the foundation for new technologies or therapeutic advancements, potentially changing the lives of many (Rosenberg, 2020). These innovators develop treatments for difficult diseases, create robots for space exploration, or devise algorithms to improve healthcare outcomes. Similarly, entrepreneurs identify and exploit opportunities to introduce new products and services to the market(Alvarez et al., 2013a). By addressing unmet needs sustainably and profitably, they contribute significantly to economic growth and societal progress (Shane and Venkataraman, 2000).

Both research and public discourse characterize entrepreneurship and innovation as risky efforts (Borchhardt and Sorenson, 2022; Drucker et al., 1998; Eberhart et al., 2017; Eisenmann, 2013; Lakhani, 2016). As such, a fundamental question is whether the processes by which innovators formulate ideas or entrepreneurs bring them to market can be made more efficient and less prone to failure (Chen et al., 2022b). Understanding and improving these processes is vital because higher-quality innovation and entrepreneurship can lead to faster economic growth (Audretsch et al., 2006; Rosenberg, 2006), job creation (Glaeser et al., 2015;

Dosi and Mohnen, 2019), and more robust and resilient markets (Van Praag et al., 2007; Arora et al., 2022). To this end, researchers across disciplines, including economics, organizational sociology, strategy, and organizational behavior, focus on understanding the crucial decisions innovators and entrepreneurs make, the obstacles that hinder their performance, and the strategies that can improve their outcomes. Notably, researchers are increasingly using field experiments to both uncover and address these challenges, testing interventions to enhance the processes of innovation and entrepreneurship (Di Stefano and Gutierrez, 2019).

Field experiments are research designs in which subjects are randomly assigned to different treatment or intervention groups within their natural environments, allowing researchers to observe the effects of interventions on people or situations (Harrison and List, 2004). Randomization, in expectation, increases the likelihood that individuals in the different groups (e.g., treatment and control) are 'balanced' on pre-treatment characteristics, both observable and unobservable (Duflo and Banerjee, 2017). This balance allows for clearer attribution of a causal effect of a treatment on the outcomes of interest because the individuals in the treatment and control groups are *all else equal* except for the intervention (Bruhn and McKenzie, 2009). Given this feature, researchers then compare the outcomes of subjects who receive these interventions (treatment group) to those who receive no intervention or a placebo (control group). The increasing popularity of this approach stems from its improved ability to assess cause-and-effect relationships compared to other methods (Di Stefano and Gutierrez, 2019). Nevertheless, we note that the integration of archival, experimental, and field experimental methodologies is key to enriching our understanding of complex phenomena. Archival research offers historical context and insights from real-world data but may face limitations in establishing causation (Duflo and Banerjee, 2017). Experimental studies, conducted in controlled settings, excel at isolating variables and establishing causation, yet they often lack external validity (Di Stefano and Gutierrez, 2019). Field experiments, acting as a bridge between the two, allow researchers to test theories and interventions in authentic settings, providing a balance between controlled conditions and real-world complexities (Bal-

dassarri and Abascal, 2017). The distinctive value of field experiments is that they provide a precise estimation of effect sizes - which also tend to be smaller compared to analyses based on archival data (Bernstein et al., 2017a). In some cases, the precision in estimating effects has resulted in field experiments that alter prevailing beliefs by providing results that are distinctively different from prior archival investigations.[1] A relevant example is related to research on idea evaluation. Traditionally, archival research suggests new ideas are systematically evaluated less positively when proposed by women (Kolev et al., 2020). However, a recent field experiment inside a large multinational compares two conditions: (a) blind evaluation, in which managers received no proposer information, and (b) non-blind evaluation, in which they received the proposer's information (Dahlander et al., 2023). Results from the field experiment show that there is no difference in the assessment when applications are blinded. This unexpected result can be the starting point for a more nuanced understanding of biases in idea evaluations as well as lead to the exploration of more effective avenues for interventions.

In recognizing the unique benefits of field experiments, this book chapter provides a critical overview of studies utilizing this methodology in the domains of innovation and entrepreneurship. We begin by reviewing existing literature that employs field experiments. We employ various methods to identify published studies and recent working papers in entrepreneurship and innovation. These include an EBSCO search for published studies in Management, Economics, and Sociology journals. Additionally, we searched Google Scholar to identify works that reference these published studies or other working papers. Our examination of existing studies aims to flesh out key assumptions and demonstrate how field experiments contribute to understanding and improving entrepreneurial and innovation outcomes by mitigating key frictions in these processes.

Building on the review, we organize the existing literature into simple frameworks that

[1]Other relevant examples beyond the realm of entrepreneurship and innovation can be found in the economics of education. This field has produced evidence suggesting that neither student (Fryer Jr, 2011) nor teacher (Fryer, 2013) behaviors significantly influence educational outcomes, contrary to much prior theoretical and empirical work using observational or laboratory studies.

facilitate a systematic understanding of their insights and spotlight opportunities for future research. Additionally, we use these frameworks to underscore essential distinctions and overlaps between innovation and entrepreneurship. Before concluding, we discuss several important practical issues related to the design and implementation of field experiments. Our goal is to offer insights based on our experience in the field, providing a behind-the-scenes perspective on aspects often overlooked in the main text of experimental articles.

2 Entrepreneurship

Who becomes an entrepreneur and who achieves success in entrepreneurship are two foundational questions extensively examined within the entrepreneurship literature (Gartner, 1989; Aldrich and Martinez, 2001; Townsend et al., 2018). Entrepreneurship research primarily examines the impact of two ex-ante factors: (a) variation in attributes like ability, experience, psychology, or endowments such as wealth and (b) variation in contextual factors encompassing organizational environment, peer influence, and family dynamics.

Supporting these lines of research is a decision based on a fundamental economic calculation a potential entrepreneur faces (Evans and Jovanovic, 1989): whether the profits (π) they can derive from their business will exceed the wages (w) they could earn through employment. Essentially, an aspiring entrepreneur's choice to pursue entrepreneurship hinges on whether the returns from entrepreneurial activities (profits) outweigh the returns from employment (wages): $\pi > w$.

This framework implies an efficient distribution of who engages in entrepreneurship and whether they succeed. However, the decision to embark on an entrepreneurial journey is uncertain (Bennett and Chatterji, 2023a). Calculating whether profits (π) will exceed wages (w) is difficult and is riddled with incomplete information (Chen et al., 2018). This is because ex-ante, entrepreneurs cannot precisely predict if their venture will be profitable. The projected profits, π, are a function of numerous choices (Gans et al., 2019), such as product

design, marketing strategy, hiring decisions, or partnerships. For each choice, the outcome distributions are highly uncertain and may range from extremely favorable to highly unfavorable (Ott and Eisenhardt, 2020; Kirtley and O'Mahony, 2023). For instance, an entrepreneur might develop a groundbreaking product, but poor management, wrong co-founders, or a misunderstanding of the industry's competitive dynamics could affect its profitability (Eisenmann, 2021). Relatedly, compensating factors like autonomy can occasionally balance out lower profits (π).

However, evidence indicates that many entrepreneurs fail regardless of whether they are in low- or high-tech domains. For instance, Fairlie and Miranda (2017) find that 84.4% of US start-ups fail within seven years. While failure is a natural aspect of entrepreneurial endeavors (Eberhart et al., 2017), most field experiments in this area concentrate on pivotal choices and decisions made by entrepreneurs at different phases of their journey, aiming to incrementally refine the probabilities of favorable outcomes.

Building on the premise that the entrepreneurial journey is layered with complexities and pivotal decisions (Clough et al., 2019), field experiments probe how the actions of entrepreneurs influence their entry into the market and subsequent performance — that is, their process (Chatterji et al., 2016). Many experiments operate on the understanding that particular frictions might hinder entrepreneurs from realizing their maximum profits (π). Such impediments can range from difficulties in adequately testing business ideas and limited familiarity with effective business practices to obtaining necessary capital (McKenzie, 2021). To address these barriers, field experiments evaluate one or more interventions tailored to mitigate these frictions. In the subsequent sections, we delve deeper into these studies, categorizing them based on the distinct stages of the entrepreneurial process.

2.1 Field experiments have focused on the four "E's" of the entrepreneurial process

We adopt a process framework to organize our review of existing field experiments in entrepreneurship. The understanding of the entrepreneurial process has evolved, with varying perspectives on its phases and scope and an overall lack of consensus on how to study the process of opportunity exploitation (Alvarez et al., 2013b; Bennett and Chatterji, 2023b). Some models have focused primarily on the early stages (Reynolds and White, 1997), while others consider the broader journey beyond just venture creation (Cardon et al., 2005; DeTienne, 2010). We adopt the latter perspective, emphasizing that the entrepreneurial process is not solely about venture creation but extends to entrepreneurial exit. Specifically, we map the entrepreneurial process following four Es:

1. **Exploration**: During this phase, potential entrepreneurs evaluate various ideas and determine whether to initiate a business.

2. **Entry**: At this stage, entrepreneurs launch their ventures, deciding what kind of business to establish, their approach, and potential co-founders.

3. **Execution**: Here, entrepreneurs manage their enterprise, deciding on resource allocation, hiring, and other organizational strategies.

4. **Exit**: Once entrepreneurs have either achieved success or, more likely, faced failure, they conclude their involvement in the business, possibly rejoining the labor market or embarking on a new entrepreneurial endeavor.

Building on the stages of Exploration, Entry, Execution, and Exit, it becomes evident that frictions often arise at each phase of the entrepreneurial journey. Most field experiments are driven by these inherent challenges, which typically hinder entrepreneurs from realizing the full potential of their efforts.

Table 1: The 4E Framework Categorizing Field Experiments in Entrepreneurship

Stage of the entrepreneur	Study	Sample size	Sample type	Country	Intervention type	Observation window (months)
Exploration	Aastebro and Hoos (2019)	150	Aspiring Entrepreneurs	France	Training	24
Exploration	Bischoff et al., (2020)	343	Students	Uganda	Training	18
Exploration	Blattman et al., (2014)	535	Subsistance Entrepreneurs	Uganda	Resource provision (cash)	48
Exploration	Camuffo et al., (2020)	116	Growth Entrepreneurs	Italy	Training	16
Exploration	Camuffo et al., (2021)	754	Growth Entrepreneurs	Italy and United Kingdom	Training	14
Exploration	Chatterji et al., (2023)	332	Students	USA	Training	0.5
Exploration	Clingingsmith and Shane (2018)	271	Aspiring Entrepreneurs	United States	Training	0.01
Exploration	Eesley and Wang (2017)	76	Students	USA	Matching-Networking	24
Exploration	Eesley and Wang (2017)	76	Students	USA	Matching-Networking	24
Exploration	Falchetti et al., (2021)	176	Mturk/Professional Investors	Internet/UK	Information	0.01
Exploration	Field et al., (2013)	845	Subsistance Entrepreneurs	India	Resource provision (loan)	24
Exploration	Fiet and Patel (2008)	52	Students	USA	Training	0.01
Exploration	Frederiks et al., (2019)	277	Students + Mturk	Netherlands	Information	0.01
Exploration	Gielnik et al., (2017)	227	Students	Kenya	Training	32
Exploration	Hasan and Koning (2019)	112	Aspiring Entrepreneurs	India	Matching-Networking	0.02
Exploration	Lafortune et al., (2017)	1712	Subsistance Entrepreneurs	Chile	Matching-Networking	12
Exploration	Lall et al., (2023)	3022	Aspiring Entrepreneurs	Global Online Platform	Information	3
Exploration	Santamaria et al., (2022)	236	Aspiring Entrepreneurs	Singapore	Training	6
Entry	Bardasi et al., (2021)	821	Subsistance Entrepreneurs	Tanzania	Training	NA
Entry	Berge et al., (2015)	644	Subsistance Entrepreneurs	Tanzania	Training	12
Entry	Dimitriadis and Koning (2022)	301	Subsistance Entrepreneurs	Togo	Training	12
Entry	Ganguli et al., (2021)	431	Social Entrepreneurs	USA	Information	12
Entry	Guzman et al., (2020)	14000	Growth Entrepreneurs	Online	Information	0.5
Entry	Hubner et al., (2020)	127	Mturk	Online	Information	0.01
Entry	Karlan and Zinman (2011)	1601	Subsistance Entrepreneurs	Philippines	Resource provision (cash)	22
Entry	Kotha et al., (2023)	181	Growth Entrepreneurs	Singapore	Training	10
Entry	McKenzie (2017)	734	Growth Entrepreneurs	Nigeria	Resource provision (cash)	27
Entry	Nagel et al., (2019)	818	Growth Entrepreneurs	Netherlands	Training	14
Entry	Novelli and Spina (2022)	269	Growth Entrepreneurs	United Kingdom	Training	9
Execution	Anderson and McKenzie (2022)	753	Growth Entrepreneurs	Nigeria	Training + Resource Provision	24
Execution	Bapna and Ganco (2021)	8,050	Crowdfunding	NA	Information	1
Execution	Berge and Pires (2020)	644	Subsistance Entrepreneurs	Tanzania	Training	12
Execution	Bernstein et al., (2015)	17000	Growth Entrepreneurs	Online	Information	1
Execution	Campos et al., (2017)	1500	Aspiring Entrepreneurs	Togo	Training	18
Execution	Chatterji et al., (2019)	100	Growth Entrepreneurs	India	Matching-Networking	24
Execution	De Mel et al., (2008)	618	Subsistance Entrepreneurs	Sri Lanka	Resource provision (cash)	14
Execution	Holm et al., (2013)	900	Top Managers	China	Training	0.01
Execution	Hussam et al., (2017)	1105	Subsistance Entrepreneurs	India	Resource provision (cash)	6
Execution	Hussam., (2017)	1,345	Subsistance Entrepreneurs	India	Resource provision (cash)	6
Execution	Nai et al., (2022)	42	Growth Entrepreneurs	India and Singapore	Information	18
Execution	Rigtering et al., (2019)	647	Employees	Netherlands	Information	
Exit	Botelho and Chang (2023)	2400	Growth Entrepreneurs	USA	Information	1
Exit	Ding et al., (2021)	275	Growth Entrepreneurs	USA	Information	1
Exit	Kacperczyk and Younkin (2022)	1223	Growth Entrepreneurs	USA	Information	1

Table 1 provides a bird-eye overview of existing field experiments in entrepreneurship and shows that the existing literature has primarily focused on the initial stages of the process. Most studies have directed their attention toward the exploration phase, while investigations into the exit phase of entrepreneurship remain scarce. Notably, training emerges as the favored form of intervention in both the exploration and entry stages. This pattern is founded on the assumption that entrepreneurs during these stages primarily lack the necessary knowledge and skills to execute their ideas or strategies effectively. In contrast, the execution phase is prominently characterized by interventions focused on providing resources, encompassing financial support and knowledge dissemination. This different modality of intervention might also be because - as emphasized by McKenzie and Woodruff (2014)—the more entrepreneurs progress in their developmental journey, the less inclined they are to engage in training activities, even when offered free of charge. Moreover, as an entrepreneurial journey unfolds, the share of useful knowledge for the entrepreneur may increasingly be tacit—and thus, 'generic' training may be less useful. Regarding the exit phase of entrepreneurship, all studies have been conducted more recently and share a common focus: providing different types of information, primarily to those evaluating former entrepreneurs seeking to re-enter the labor market. The overview of field experiments in entrepreneurship presented in Table 1 underscores key research gaps for exploration in future studies. Firstly, a notable gap exists in the investigation of 'transition points' between different stages of the entrepreneurial process. Future field experiments could effectively examine the dynamics of the transitional phase from exploration to execution, offering valuable insights into this pivotal point.

Secondly, existing field experiments have had a limited focus on the execution phase of entrepreneurship. Subsequent studies have the potential to study interventions and challenges specifically associated with this critical stage of business development, contributing to a more complete understanding of the entrepreneurial process.

Thirdly, the few field experiments on exit exclusively use information-based interventions to study the challenges former founders face when they seek to re-enter the labor mar-

ket. Future research endeavors could explore diverse aspects of entrepreneurial exit through other intervention types, shedding light on the complexities and dynamics surrounding post-entrepreneurship career transitions.

Fourthly, our analysis identifies five primary categories of interventions frequently mentioned in the literature. These categories include (a) training, (b) information dissemination, encompassing both social and non-social information, (c) matching and networking, (d) incentives, and (e) resource provision, which often takes the form of loans or cash grants. In addition to these conventional types of interventions, there exists a potential to explore alternative approaches. These may involve theory-driven interventions, such as the implementation of novel contract types or the integration of new technologies, as well as other novel mechanisms. Such approaches could assist entrepreneurs in advancing through the four stages of the entrepreneurial process.

These identified gaps signify promising avenues for future research to expand and deepen our comprehension of entrepreneurship, informing targeted interventions and strategies at various stages of the entrepreneurial process.

For a more in-depth understanding, the subsequent sections delve deeper into these frictions and provide examples from selected studies to illustrate the critical interventions used within each area.

2.1.1 Exploration

During the pre-entry exploration phase, research has predominantly focused on enhancing individuals' capacity to accurately assess the profit potential of a business idea before committing to its initiation. In this stage, entrepreneurs navigate an environment where their understanding of the business prospects remains partial (Chen et al., 2022a). This limited insight can lead to expensive misjudgments, manifesting in two prominent empirical trends: excess entry (an overabundance of individuals starting businesses) and delayed exit (entrepreneurs persisting with their ventures despite receiving adverse feedback regarding their

potential) (Camerer and Lovallo, 1999). These observed trends can be attributed to factors like optimism (Dushnitsky, 2010), overconfidence (Forbes, 2005), a preference for ambiguity (Gutierrez et al., 2020), and flawed judgment (Hogarth and Karelaia, 2012). Consequently, field experiments within this realm aim to aid entrepreneurs in refining their opportunity assessment process and mitigating judgmental errors with training emerging as the predominant tool for this purpose. Notably, research in this area primarily examines the effects of delivering educational content to entrepreneurs by comparing the outcomes of teaching particular topics to the outcomes when different topics or no content are provided.

One group of field experiments aiming to support entrepreneurs evaluating ideas provides training and tools to assess the prospects of business ideas to entrepreneurs. For instance, Camuffo et al. (2020) provide intensive treatment to one group of aspiring entrepreneurs to learn about a scientific approach to decision-making — inspired by the hypotheses-testing approach followed in science. Entrepreneurs who learn a scientific approach start with a theory about their business, develop critical hypotheses, and systematically test them before deciding what to do while learning about market validation. The control group receives comparable content on market validation without the scientific approach. Initial results from a sample of 116 aspiring entrepreneurs indicate that a scientific approach leads entrepreneurs to terminate their businesses more than in the control group and change their ideas more frequently. These results have been replicated in Camuffo et al. (2021) that show that with a larger sample (754), the scientific approach also increases revenue over 14 months.

In a similar vein, Chatterji et al. (2023) in an RCT with 332 MBA students found that evaluating ideas using a structured schema, not only enhance their ability to assess other people's ideas (by over 17% relative to the control group) but also improve their skill in generating high-quality ideas (about 16% higher than the ideas in the control group). This enhancement is primarily attributed to their improved ability to discriminate between their own high- and low-quality ideas. Åstebro and Hoos (2021) also find that teaching analytical skills, in particular, business model design and the lean-startup method, appear to matter

more for entrepreneurial outcomes in the context of two field experiments with 100 aspiring social entrepreneurs in France.

Other constraints on idea generation include not having the relevant information about customers or a problem domain. Hasan and Koning (2019) find at a boot camp with 112 early-stage software-product entrepreneurs in India, early conversations influence the quality of ideas these aspiring entrepreneurs produce. Treated entrepreneurs are randomly assigned to three conversations, each lasting 14 minutes. This randomization created exogenous variation in the pairing of different personality traits of both the idea generators and their conversational peers. Individuals who participate in richer information-driven discussions tend to generate better ideas, which in turn enhance the performance of their teams.

These examples illustrate different experimental approaches that overall aim to address the challenges inherent in the exploration stage of entrepreneurship, bridging knowledge gaps and facilitating better information gathering with different interventions.

2.1.2 Entry

After examining multiple entrepreneurial ideas, entrepreneurs choose one to develop into a business. The progression from exploration to entry is not dictated solely by the value of the chosen idea. Material, social, and skill-based factors play a significant role in an individual's decision to establish a business based on their chosen concept (Bennett and Chatterji, 2023a). For example, while constraints in capital or a deficiency in business knowledge might obstruct entry, irrespective of the idea's quality, overconfidence in one's concept or capabilities might precipitate premature entry, increasing the risk of failure (Chen et al., 2022b). Field experiments focusing on this phase of the entrepreneurial process aim to remedy these frictions by evaluating the impact of interventions that mitigate resource or knowledge gaps.

One of the significant challenges faced by entrepreneurs, especially those from underrepresented or disadvantaged backgrounds (e.g., women, minorities, and those in developing

countries), is limited access to capital as access to financial resources is essential for starting, maintaining, and growing a business (Clough et al., 2019). Entrepreneurs from these groups often encounter difficulties securing financial support due to biases in lending institutions (Vissa, 2011), limited networking opportunities (Hallen, 2008), or a lack of collateral (Jensen et al., 2022). These financial challenges can restrict their ability to invest in business essentials, employ staff, market their products, or cover operational costs. Such constraints can increase the risks associated with business failure and, therefore, may discourage potential entrepreneurs from starting up (Bennett and Robinson, 2023).

Field experiments have, therefore, increasingly been used to assess the impact of financial constraints on entrepreneurial entry. McKenzie (2017) examines the impact of monetary resources as a constraint for growth with an RCT embedded in a business plan competition in Nigeria. 729 semifinalists are part of the treatment group and randomly granted awards (averaging 50,000 USD) - their outcomes are compared to a control group that does not receive any awards. Results - three years after winning the grant - show that grants result in increased firm entry (37 percentage points), survival (21 percentage points, and employment growth (about 20 percentage points), pf 17 percent). Treated firms are also innovating more, and are earning higher sales and profits. Blattman et al. (2014) find that cash transfers of USD 150 to poor entrepreneurs in Uganda lead to double their microenterprise ownership and incomes. Similarly, Hussam et al. (2022) ran a field experiment with 1,345 micro-entrepreneurs in India, where treated entrepreneurs receive a 100 USD grant. Their results indicate that not all entrepreneurs benefit equally from the capital. They show that individuals identified by their communities—as those with a subjectively higher likelihood of succeeding—benefit most, having rates of return on capital that are sometimes two to three times as high as the median entrepreneur. These findings suggest that lack of access to capital is a crucial constraint on entrepreneurial entry—and that, if allocated to the most promising entrepreneurs, it may lead to higher growth businesses entering.

The financial constraints faced by entrepreneurs might also originate from biases and fric-

tions on the investor's side, rather than solely from the entrepreneur's perspective. Studies on resource providers indicate that some novice investors, for instance, those on crowdfunding platforms, might sort themselves into investing in ventures based on homophily (Bapna and Ganco, 2021). In a similar vein, Bernstein et al. (2017b) determined that early-stage investors place significant emphasis on team-based indicators of startup quality, such as the college attended by founders. This might result in funds being allocated disproportionately to individuals associated with high-status colleges or employers. Moreover, Younkin and Kuppuswamy (2018) found that investors assess businesses established by African Americans less favorably than similar ones initiated by White founders. Consequently, this body of research implies that refining how investors assess business proposals could aid in alleviating capital constraints, especially for individuals from underrepresented backgrounds. To this end, a recent study by Miller (2023), for instance, employed a field experiment to estimate what happens when investors use structured methods to evaluate 1,871 requests for entrepreneurial funding. The findings revealed that introducing a more structured system for evaluating business ideas (treatment) diminishes bias when assessing women-owned businesses, leading to improved scores and increased funding for them.

Field experiments have also frequently explored the impact of business training on entrepreneurial entry. Given the importance of knowledge and skills in facilitating successful entrepreneurship, these experiments provide insights into effective educational interventions. For instance, Gielnik et al. (2017) examine the impact of teaching an action-oriented approach to entrepreneurship to 227 students in Nigeria with an interest in starting a business. An action-oriented approach provides hands-on knowledge and specific guidelines about the appropriate actions in entrepreneurship to equip entrepreneurs with the knowledge to decide what to do when starting a business. This study compares the outcomes of the students who received action-oriented training with those who received none. The authors followed all entrepreneurs for 32 months and found that action-based training increased entrepreneurial entry primarily by enhancing the self-efficacy of the aspiring entrepreneurs. Finally, San-

tamaria et al. (2022) conducted a field experiment with 236 aspiring entrepreneurs and compared approaches that prioritize demand-side activities (i.e., teaching entrepreneurs to prioritize customer needs in developing and launching a product) versus a training prioritizing resource-side activities (i.e., teaching entrepreneurs to prioritize their resources and what they can offer when developing and launching a product). Results after 6 months indicate that prioritizing customer needs is more effective for entrepreneurs in terms of entry and eventual revenue.

Another approach to alleviating knowledge-related friction in the entry stage of entrepreneurship has been to facilitate matches with individuals possessing entrepreneurship expertise. For instance, Eesley and Wang (2017) randomly assign 206 students interested in entrepreneurship to either entrepreneur (treatment group) or non-entrepreneur mentors (control group) and examine their career choices over time. Their results indicate that interacting with an entrepreneur mentor increases the likelihood of entrepreneurial careers (as early joiners of ventures), particularly for students whose parents were not entrepreneurs. Three years after the intervention this increased entrepreneurial entry is not associated with lower-quality businesses, suggesting that entrepreneurial mentors can increase effective entry.

2.1.3 Execution

Another stream of research employing field experiments to delve into entrepreneurship targets the execution phase. This phase, akin to the entry stage, grapples with a myriad of constraints. Beyond the evident challenges tied to skills and financial resources, the execution phase brings to the fore organizational challenges that can make or break a venture. For instance, critical decisions on team composition (Lazar et al., 2020), discerning when to handle tasks personally versus delegating (Van Lancker et al., 2023), and the art of networking becomes paramount (Nai et al., 2022). Additionally, these studies emphasize the importance of guidance for business owners, fostering connections to not just potential clients but also advisors. Such experiments underscore that while the conception and initiation of a ven-

ture are key, the real test of entrepreneurial performance lies in navigating the challenges of execution.

While skills are important for the successful execution of entrepreneurial activities, unlike the early stages, the operation of a business requires more specialized expertise. Specifically, a business demands proficiency in areas such as accounting, marketing, and finance. Furthermore, "soft skills," such as effective delegation both internally and externally, are fundamental. Anderson et al. (2018) conducted a field experiment with 852 businesses in South Africa, comparing interventions that bolstered marketing skills to those enhancing finance skills. Their results indicated that both training methods boosted profitability. Marketing training increased growth and sales, while finance training increased efficiency and cost-saving. In a separate study in Nigeria with 753 firms, Anderson and McKenzie (2022) determined that insourcing and outsourcing proved more effective and cost-efficient than conventional business training to help these entrepreneurial firms grow. Often, entrepreneurs benefit more from delegating tasks to employees or freelancers than handling them personally, freeing them to focus on other pressing business matters.

Beyond the effects of skills training, research has investigated the impact of "informal" knowledge transfer and learning on entrepreneurial performance. In a study with 100 high-growth software startups in India, Chatterji et al. (2019) noted that many founders did not adopt formal people management practices, such as setting individual and group targets and providing regular feedback. However, after receiving advice on formal employee management from experienced peers (treatment), these businesses experienced 28% more employee growth over the subsequent two years and had a 10% higher survival rate compared to founders who were advised by peers without prior formal management practices. In a related study, Dimitriadis and Koning (2022) also examined the effect of informal knowledge transfer as part of a program for entrepreneurs in Togo. Their intervention taught 278 individuals to network rather than pairing them randomly for advice. Their findings revealed that entrepreneurs given social skills training networked more extensively, and this enhanced

networking contributed to improved financial performance for their ventures.

2.1.4 Exit

While a key component of the entrepreneurial journey, entrepreneurial exit remains one of the least explored areas concerning field experimental methods. As ventures evolve, entrepreneurs typically face three potential outcomes: discontinuing their business to rejoin the traditional labor market, persisting in their entrepreneurial endeavors, or transferring ownership by selling their business. Despite its significance, the decision-making surrounding these choices remains less well-understood. Emerging research underscores numerous challenges and frictions inherent in the exit phase that influence the trajectory of an entrepreneur post-venture and potentially impact other facets of the entrepreneurial ecosystem.

When entrepreneurs consider quitting, the decision to terminate a business uses a calculus similar to the one used to start it. Specifically, an entrepreneur evaluates their realized profits π and compares them to outside options, such as a wage w, a peer business, or another possible venture they could start with different profit potential. However, many entrepreneurs might lack the information to make well-informed decisions about when to exit. A recent study of 194 entrepreneurs in Singapore's hawker centers by Hou and Png (2022) revealed that numerous entrepreneurs are unaware of how their business performance compares to their peers. Their experiment randomly provided benchmarking information to a subset of businesses (treatment group) while leaving others uninformed. The findings showed that upon realizing their business was underperforming, entrepreneurs exited at higher rates. This finding underscores the notion that a lack of accurate self-assessment leads many entrepreneurs to persist with underperforming ventures.

Beyond the choice to exit, field experiments have studied the labor market outcomes of entrepreneurs who have not succeeded in their ventures. Three recent studies have attempted to quantify the effect of having an entrepreneurial past on labor market success. Botelho and Chang (2023) conducted an experiment where they sent applications varying the candidate's

founder experience to 2,400 software engineering positions in the United States at random. They found that former founders received 43% fewer job callbacks than non-founders, especially from older firms, with successful founders facing a more significant penalty. This finding suggests that firms may worry about hiring former entrepreneurs due to issues of fit and commitment. Ding et al. (2021) find similar results, with former founders being 23-29% less likely to be considered a top choice for recruiters. However, an interesting caveat is that the magnitude of this penalty weakens if the recruiter has entrepreneurial intentions or works for a small firm where entrepreneurial skill sets are more valued. Finally, Kacperczyk and Younkin (2022) also find a penalty for former founders on the labor market, with more penalties for males versus females. These findings suggest that entrepreneurial failure may have costs for entrepreneurs extending beyond the closing of their business.

3 Field experiments in innovation

While field experiments are increasingly popular in entrepreneurship research, they are just beginning to appear in the study of innovation. The innovation process has two connected parts: research and development (R&D), which encompasses the systematic investigation and experimentation aimed at creating new knowledge, products, or processes to drive innovation (Knudsen and Levinthal, 2007). The "R" or research part centers on creating new ideas. These ideas often come from research teams at universities or inside companies (Boudreau et al., 2016a). In the "D" or development part, these early ideas receive resources and support to grow into actual products or services. Connecting these two parts is a continuous flow of checks and evaluations (Uzzi et al., 2013) (Fleming, 2001). Such evaluations help determine whether to keep supporting research, development, and investment in one idea out of many options (Manso, 2011). We report an overview of field experiments in Table 2 below and provide additional details on selected studies in the following paragraphs.

One body of literature on innovation focuses on the generation of new knowledge (Boudreau

Table 2: Field Experiments on Research & Development of Innovation

Innovation Study	Sample size	Sample type	Country	Intervention type	Observation window (months)
Boudreau and Lakhani (2015)	733	TopCoder members	online	Information	1
Boudreau et al. (2012)	435	researchers	US	Matching-Networking	12
Boudreau et al. (2017)	435	researchers	US	Matching-Networking	12
Burtch et al., (2015)	128701	crowdfunders	online	Information	0.5
Carson et al., (2022)	150	students	US	Incentives	0.06
Ehls et al., (2021)	2268	problem solvers and community evaluators	NA	Information	NA
Gallus et al, (2020)	7455	employees	US	Incentives (recognition)	0.5
Ghosh and Wu (2023)	210	general public	US	Matching-Networking (coordination)	0.03
Jung (2023)	3343	employees	US	Incentive (contest)	NA
Lane et al., (2021)	402	scientists	US	Matching-Networking	72
Lane et al., (2022)	97	faculty & reserach staff at US hospitals	US	Information (social)	6
Teplitskiy et al., (2019)	277	faulty members of US medical schools	US	Information (social)	0.03
Zivin and Lyons (2018)	190	students	US	Incentive	2
Zivin and Lyons (2019)	1000	students	US	Incentive	NA
Zivin and Lyons (2021)	184	non-management employees of Thermo Fisher Sientific & STEM students	US	Incentive	0.06

et al., 2016a). A central theme of this work is that scientific ideas are shaped by the networks in which these individuals are embedded—e.g., collaboration and co-location. The theoretical rationale is that bringing diverse individuals together will increase the generation of novel ideas. Boudreau et al. (2017), for instance, show that search costs (e.g., finding relevant collaborators) limit the formation of fruitful research collaborations. In a field experiment with 435 scientists in the US that exogenously varies the cost of learning about colleagues, the researchers show that 90-minute structured information-sharing sessions (the treatment) increase collaboration rates, particularly with individuals who have overlapping research interests but do not know each other. Similarly, research by Lane et al. (2021) tracks for 6 years scientists who were randomly paired to interact during a medical symposium. The researchers find that scientists exposed to the treatment (meeting another scientist face-to-face) were more likely to coauthor papers when they had overlapping interests. However, they also cited each other's work less when from the same field. These dual effects highlight both the collaborative and competitive impacts of knowledge similarity.

Another significant body of research focuses on the evaluation process in innovation (Perry-Smith and Mannucci, 2015). Because the true promise of an innovative idea is unknown ex-ante—due to technological or market uncertainty—scientific institutions (e.g., grant-making bodies, journals, hiring committees) must make ex-ante judgments about the prospects of an idea. These judgments are based on prior knowledge, experience, and perhaps some other considerations (e.g., competition, risk tolerance). For instance, Carson et al. (2022) conducted an experiment with 150 participants and found that managers prefer lower-risk research projects despite financial incentives favoring higher-risk ones. However, the researchers found that risk preferences and training can mitigate some of these effects to increase the selection of more potentially rewarding high-risk projects. Similarly, another study by Lane et al. (2022) conducts a field experiment in the context of a grant evaluation of 97 projects. The authors find that when expert evaluators share information during project evaluations, there is a noticeable negativity bias, leading to conservative decisions

that prioritize avoiding failure over maximizing success. Relatedly, Boudreau et al. (2016b) find that evaluators tend to give lower scores to research proposals closer to their expertise and highly novel ones. This finding suggests that biases in assessing innovative ideas can limit the further development of the most novel ideas. However, Teplitskiy et al. (2022) finds correlational but promising evidence that, at least in scientific journals, this bias towards conservatism is less pronounced as manuscripts with higher novelty are consistently associated with higher acceptance in scientific journals.

While these studies contribute valuable insights into important aspects of the innovation process, namely initial idea generation (Boudreau et al., 2016a) and idea evaluation (Perry-Smith and Mannucci, 2015), the innovation process is much more complex with additional steps and stages that provide opportunities for researchers looking to provide novel insights through field experiments. For instance, the current body of research predominantly focuses on the initial stages of innovation, specifically on idea generation and evaluation but later stages of innovation involve the incremental refinement of innovative ideas and carefully developing and honing concepts to work out their intricacies. Moreover, While the existing studies acknowledge the importance of teams in innovation, there is a lack of in-depth exploration into team dynamics and their influence on the generation and development of high-quality ideas. Future studies are needed to better understand effective leadership and coordination mechanisms within research labs or corporate R&D teams. Furthermore, organizations must determine which ideas should be commercialized and how and which should be protected. The literature lacks comprehensive insights into how organizations make decisions regarding the commercialization of ideas. Understanding the criteria for selecting ideas for commercialization, strategies for protection, and the decision-making processes in this domain represents a significant gap in current research. Field experiments on these latter issues are still in their early stages; many of them have not yet appeared in the literature. However, field experiments can be a fruitful methodology for studying the innovation process from the early stages of idea generation to evaluation and development.

4 Conclusion

This chapter has provided an overview of the role of field experiments in entrepreneurship and innovation. By examining the challenges and frictions that innovators and entrepreneurs face, we can identify opportunities for improvement and develop strategies to mitigate these obstacles. By reviewing existing literature and organizing initial frameworks, we have highlighted the distinctions and overlaps between innovation and entrepreneurship. Furthermore, we have discussed several important issues that are still under-explored in existing literature, offering opportunities for new research. By leveraging the insights from field experiments, researchers can contribute to a more nuanced understanding of the frictions that make innovation and entrepreneurship processes fraught with failure, as well as interventions that can reliably improve outcomes.

Field experiments are powerful tools for researchers, but they are often seen as costly and risky ways to collect data. Hoping to encourage others to fruitfully run field experiments, we conclude this chapter by discussing practical aspects frequently not part of the primary content of experimental articles.

4.0.1 Mitigating Risks and Achieving Success in Your Field Experiments

Field experiments, like entrepreneurship, require a variety of skills (Lazar et al., 2020). These encompass statistical expertise for experiment design and theoretical knowledge for defining the problem and creating effective interventions. Moreover, running a field experiment involves fundraising, comparable to starting a new business, networking abilities for securing field sites, interpersonal skills for assembling and managing a research team, and the resilience to handle the inherent risk and uncertainty. Consequently, we identify six key considerations for ensuring that a field experiment evolves into an insightful research study.

First, start small. If you are new to field experiments, starting with a small pilot study is perhaps wise to gain practical experience and tacit knowledge. What you will learn through your pilots is probably not in any book.

Second, have a well-thought-out plan, including a robust theoretical framework that will guide the design of your intervention and your measurement strategy. Use a pre-registration and pre-analysis document and plan out the little details of your experiment and the paper you will write. Pre-registration is good practice for study design and will make your job a lot easier when it comes time to write your paper. You can also use other tools such as the Strategy Experiment Canvas[2] to plan out the paper you will write with your field experiment.

Third, your plans will fail in some way. It is essential to build 'slack' into your experiment, especially in your data collection process. Collect a broad range of data (informed by theory, of course), including qualitative insights and data that will allow you to capture mechanisms (e.g., the "how" of your intervention's effect). Beyond slack, it is important to remain flexible as many things can go wrong (e.g., the internet goes down, no electricity for days, a strike, a heatwave). Modularize your study and have backup plans for data collection. For instance, if your study gets cut short by a few days, make sure you have data on outcomes that are measured more continuously so that such failure does not doom the entire study. Or if the internet goes down, carry a printer to print out paper surveys (with pens!) that can be handed out to subjects.

Fourth, build a great team. Field experiments are stressful and much more prone to catastrophic failure than other research approaches. Having a team that is both skilled and one where you have built up trust and psychological safety is crucial to identifying problems early and resolving them effectively.

Fifth, beyond building trust within your team, build trust with your subjects and field partners. Understand their needs and ensure that you strive towards ethical engagement with both subjects and partners and drive towards an outcome that ideally benefits all participants in your study.

Finally, field experiments are incredibly fun. Embrace the adventure — travel to new

[2]A link to the Strategy Experiment Canvas can be found here: `https://cfxs.org`

countries, meet new people, and hopefully gain insight into problems that could directly impact people's lives.

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