Fundamentals of ENTREPRENEURIAL FINANCE

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the funding of the VC fund. Institutional investors are large investment managers, such as pension funds, insurance companies, university endowments, sovereign wealth funds, investment banks (representing themselves or their clients), wealthy families, and others.

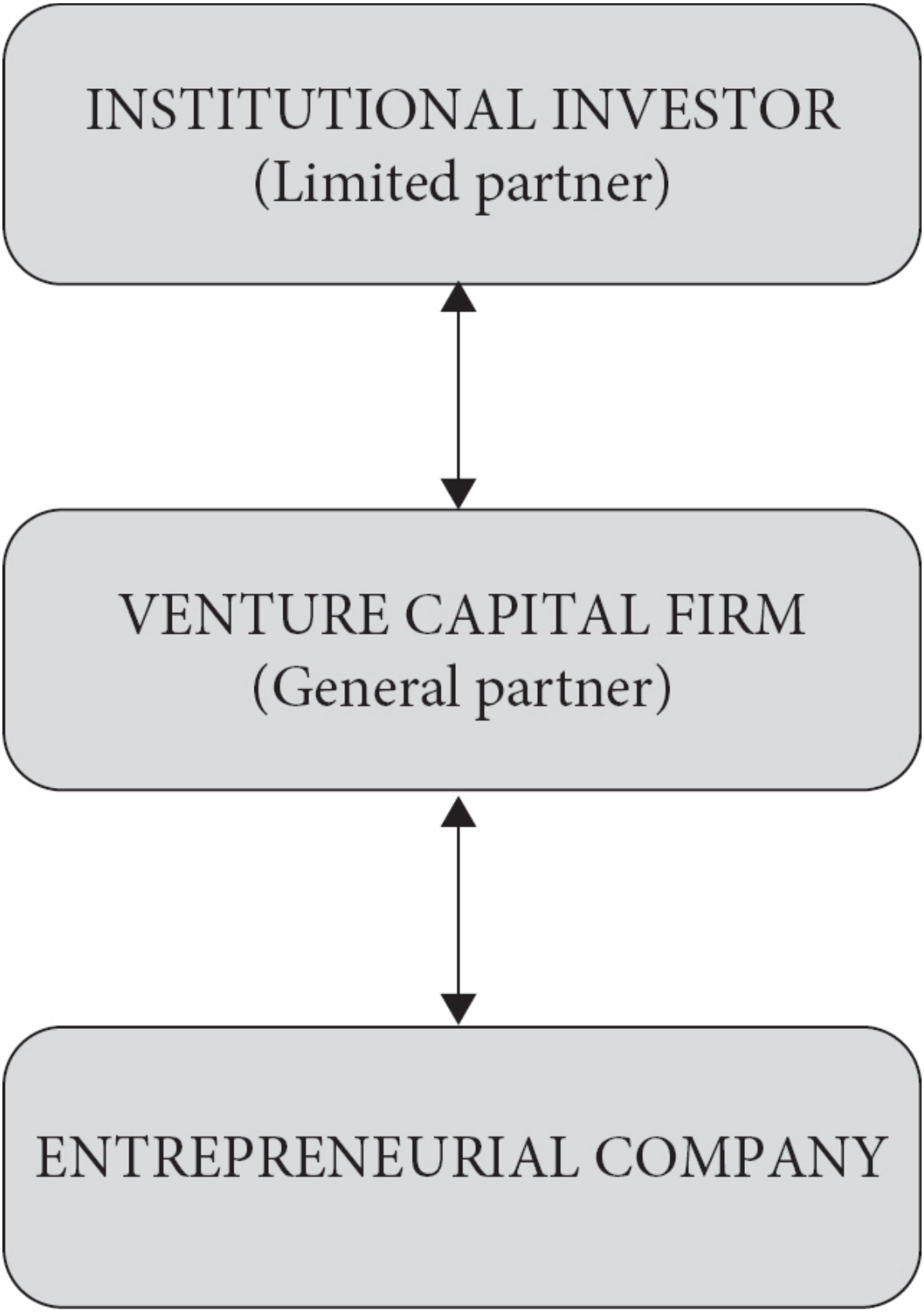


Figure 1.12 The venture capital structure.

Why does the fundamental structure matter? First, we consider whose money is being invested and how much of it. Most angels only invest relatively modest

amounts, limited by how much wealth they have and how much they are willing to risk. By contrast, VCs can have access to much larger sums of money, depending on the size of the fund (which can range between $50M and over $1B). Second, we consider who makes the key decisions. Angel investors make their own decisions, whereas VCs take decisions by investment committees that are governed by partnership rules and may be subject to oversight by the limited partners. Clearly, we would expect different investments to come out of these different investor structures. In fact, the same individual may adopt different investment styles when acting as a VC versus investing privately as an angel investor.

The second core concept, the U in FUEL, looks at the *underlying motivation* of the investors. It considers their objectives, asking what motivates them to invest in the first place. We pay close attention to the relative importance of financial returns versus nonfinancial considerations. Some investors only focus on generating financial returns, whereas others pursue a broader set of objectives. In addition to financial returns, they may care about their personal interest in what the entrepreneur does, the potential social and economic impact of the venture, or any strategic synergies between the investor's organization and the entrepreneurial company. Other aspects of investor motivation concern risk tolerance and the investor's amount of patience.

If we look at the different motivations of angels and VCs, we note that the fundamental structure of VC firms provides strong incentives for generating financial returns. Consequently, VCs mostly care about making money. By contrast, angel investors can have a variety of goals. Beyond financial returns, they can be motivated by the social contribution of the venture, the thrill of staying involved in the entrepreneurial process, or sometimes just the company of other fellow angels. Lee Hower, who was part of LinkedIn's founding team and is now an experienced investor, lists five main motivations: return, market insights, path to a VC career, help to the community, and personal enjoyment.[46]

The third core concept, the E in FUEL, looks at the *expertise and networks* the investor brings to the deal. To see why this matters, recall the fundamental principles of the entrepreneurial process from Box 1.1: entrepreneurs gather resources in an environment with high uncertainty where learning is essential. To contribute to this entrepreneurial process, an investor needs competencies. E*xpertise* is needed to properly screen out the right companies and add value along the ride. *Networks* are needed to help the entrepreneur gain access to key resources as the venture develops. Put differently, expertise concerns the knowledge and skills that the investors have by themselves, and networks concern the knowledge and skills that they can gain access to.

Applying this analysis to angels and VCs, we note that angels' expertise and networks are closely related to who they are. An experienced entrepreneur will bring very different skills and networks to the table than a successful lawyer or executive, let alone the heir of a large family fortune. As for VC firms, their networks include not only those of the individual partners, but also the historic and institutional links that the VC firm has as an organization. Investor

differences along the expertise and network spectrum have far-reaching implications for how these investors behave and for how attractive they are to potential entrepreneurs. You would expect different help from a small local VC firm versus a top Silicon Valley VC firm.

The fourth core concept, the L in FUEL, looks at the investor's *logic and style*. By *logic* we mean the investment criteria used to make investment decisions. These concern preferences as to the industry, location, and stage of the company, as well as many more detailed criteria that an investor may have. The *style* concerns the way the investor interacts with the entrepreneurs. Different investors behave differently, and this also depends on the stages of the entrepreneurial process.

This fourth concept of the FUEL framework naturally links up to the FIRE framework. The "logic" component links to the first (Fit) and second (Invest) steps of the FIRE framework. It looks at what types of deals make sense and how to structure them. The "style" component then considers how the investor and entrepreneur interact throughout the rest of entrepreneurial financing process, that is, the Ride and Exit steps.

Angels and VCs tend to have their own distinct logic and style of making investments. There are many nuances not only across but also within investor types. By and large, angels are open to a larger variety of business opportunities, whereas VCs tend to focus on a narrower range of industries, stages, and locations. This is partly because they are accountable to their limited partners. There are also numerous differences in terms of investment style, such as how active they get involved in their companies, how they approach later-round financings, and what kind of exits they envision. We will encounter numerous such style differences throughout the book.

The FUEL framework provides a logical thread to understand investors in entrepreneurial companies, which we examine in Chapters 12–14. These chapters look at the investor landscape and explain its diversity and interactions. Chapter 12 explains how venture capital works. Chapter 13 surveys a large number of different early-stage investor types, including family and friends, individual angels, angel groups, corporate investors, crowdfunding, Initial Coin Offerings, accelerators, technology transfer funds, and social impact venture investors. Finally, Chapter 14 looks at clusters of entrepreneurs, investors, and relevant third parties, all of whom interact with each other to form powerful entrepreneurial ecosystems.

Summary

In this chapter, we analyze the core aspects of the entrepreneurial finance process. We examine how entrepreneurs get funded and what challenges this implies. We explain the clash between the disciplined world of finance and the unpredictable world of entrepreneurship. We identify three fundamental principles of entrepreneurship relevant for fundraising: resource-gathering, uncertainty, and

experimentation. They help explain why the investment process is inherently challenging for both sides and important for the economy at large. We introduce the FIRE framework to study the process of how entrepreneurs and investors interact throughout the investment cycle. We then identify the key players in the entrepreneurial ecosystem and recognize that there is considerable diversity across different types of investors. We also introduce the FUEL framework to examine the differences across the main investor types.

Review Questions

1. What are the key differences between financing entrepreneurial and established companies?
2. Entrepreneurship involves resource gathering, uncertainty, and experimentation. How does this affect the investors?
3. What steps are needed to show that entrepreneurial finance is beneficial to the economy at large?
4. What are the main challenges that entrepreneurs and investors face at the four steps of the funding cycle, as described in the FIRE framework?
5. What is the purpose of staged financing?
6. What can and can't we learn from successful start-ups like Pandora's Box and Spotify?
7. What are the main types of investors that fund entrepreneurial ventures?
8. Why does the identity of investors matter to the entrepreneurs?
9. What are the most important differences between VCs and angel investors?
10. What are the respective roles of conceptual frameworks and practical experience for mastering entrepreneurial finance?

Notes

1. Shepherd and Patzelt (2018).
2. Koellinger and Thurik (2012).
3. Carland et al. (1984) and Schoar (2010).
4. Hurst and Pugsley (2011).
5. This structure of the entrepreneurial process goes back to Stevenson, Roberts, and Grousbeck (1998), and is discussed in modern textbooks, such as Barringer and Ireland (2015), Bygrave and Zacharakis (2014), Hisrich Peters, and Shepherd (2016), and Kuratko (2016), among others.
6. Schumpeter (1934, 1942).
7. Knight (1921).
8. Kihlstrom and Laffont (1979) discuss some theory, and Forlani and Mullins (2000) and Hvide and Panos (2014) discuss some evidence on the risk preferences of entrepreneurs.
9. March (1991, 2008).
10. Swift (2016).
11. For the trade-off between risk and reward, see Berk and DeMarzo (2016).

12. https://www.nobelprize.org/prizes/economic-sciences/1987/press-release.
13. https://www.nobelprize.org/prizes/economic-sciences/2018/press-release.
14. Solow (2000).
15. Seminal papers include Romer (1986, 1990), Lucas (1988), and Aghion and Howitt (1992). A recent contribution is Akcigit and Kerr (2018). See Romer (1994), Aghion and Howitt (1998), and Acemoglu (2009) for overviews.
16. See Haltiwanger, Jarmin, and Miranda (2013) and Decker et al. (2014), which provides a less technical overview.
17. Sedláček and Sterk (2017).
18. Chemmanur, Krishnan, and Nandy (2011).
19. Kortum and Lerner (2000).
20. Samila and Sorenson (2011).
21. Kerr, Lerner, and Schoar (2014) and Lerner et al. (2018).
22. Wilson (2011).
23. Gornall and Strebulaev (2015).
24. Foster and Kaplan (2003) and Anthony et al. (2018).
25. An interactive updated list of unicorns (privately held ventures valued over $1B) can be found at https://www.wsj.com/graphics/billion-dollar-club.
26. Hall and Woodward (2010).
27. Shane (2012) and Puri and Zarutskie (2012).
28. Puri and Zarutskie (2012).
29. For some academic references on the entrepreneurial finance process, see Da Rin, Hellmann, and Puri (2013), Gorman and Sahlman (1989), and Kerr and Nanda (2015).
30. For some academic references on the "Fit" stage, see Bottazzi, Da Rin, and Hellmann (2016), Hegde and Tumlinson (2014), Hochberg, Ljungqvist, and Lu (2007), and Sorenson and Stuart (2001).
31. Murnieks et al. (2016).
32. Parhankangas and Ehrlich (2014).
33. Bernstein, Korteweg, and Laws (2017).
34. For some academic references on the Invest stage, see Hsu (2004), Kaplan and Strömberg (2003, 2004), Kerr, Lerner, and Schoar (2014), and Robb and Robinson (2012).
35. For some academic references on the Ride stage, see Bottazzi, Da Rin, and Hellmann (2008), Casamatta (2003), Croce, Martí, and Murtinu (2013), Hellmann and Puri (2002), Sapienza (1992), and Sapienza and Gupta (1994).
36. Dixit and Pindyck (1994), and Kerr, Nanda, and Rhodes-Kropf (2014).
37. For some academic references on the Exit stage, see Amit, Brander, and Zott (1998), Brav and Gompers (1997), Gompers (1996), Gompers and Lerner (1999), Lerner (1994), and Puri and Zarutskie (2012).
38. PitchBook-NVCA Venture Monitor, retrieved on November 12, 2018 from https://pitchbook.com/news/reports/2q-2018-pitchbook-nvca-venture-monitor.
39. References on Pandora's Box include Clifford (2007), Rao (2011), Panchadar and Sharma (2018), and Wasserman and Maurice (2008). See also Pandora Media's IPO prospectus and S-1 form, available at https://www.sec.gov/edgar.shtml. For Spotify, see Dunbar, Foerster, and Mark (2018) and Bahler (2018).
40. Swift (2014).
41. Ante (2008).
42. Hsu and Kenney (2005).

43. A useful and concise summary of the voyages of Christopher Columbus can be found in Boorstin (1983).
44. Kerr and Nanda (2015) and Robb and Robinson (2012).
45. For some academic references on understanding the investor side, see Dimov and Shepherd (2005), Gompers et al. (2019), Metrick and Yasuda (2010a), and Sahlman (1990).
46. Hower (2013).

2

Evaluating Venture Opportunities

Learning Goals

In this chapter students will learn:

1. A structured framework for evaluating venture opportunities.
2. How to break down a business's value proposition into its individual components.
3. To assess the attractiveness, risks, and competitive advantages of a new venture.
4. How to perform due diligence on a new venture's business plan.

This chapter explains how to evaluate a venture opportunity. We introduce the Venture Evaluation Matrix (VE Matrix), a framework for assessing the prospects of a new business. The framework recognizes the importance of building a value proposition around a real customer need, a competitive solution, and a team able to execute its plans. Its matrix structure generates conclusions about the venture's attractiveness, risks, and potential competitive advantages. The VE Matrix can be used by investors to evaluate the strengths and weaknesses of business opportunities along multiple dimensions. It also helps entrepreneurs to anticipate investors' concerns and to structure their investor pitch. The chapter discusses how different investors take different approaches to business evaluation and explains how they practically make decisions.

2.1 Assessing Opportunities

Assessing venture opportunities is difficult. Picking good companies may account for as much as half of the success in venture investing.[1] Yet even the most experienced investors often make mistakes. Bessemer Ventures, a top-flight U.S. venture capital (VC) firm, openly lists the successful companies it turned down: Airbnb, Apple, eBay, Facebook,

Google, Intel, and so on. One of the partners commented on why eBay had been rejected: "Stamps? Coins? Comic books? You've GOT to be kidding. No-brainer pass."[2] In the absence of perfect foresight, how should an investor evaluate an entrepreneur?

The starting point for any investment is the underlying business opportunity and the existence of a business model to make it profitable. There is no single definition of business model, a concept that emerged in the 1990s and is still evolving.[3] A useful definition for our purpose is the following: "A business model articulates the logic, the data and other evidence that support a value proposition for the customer, and a viable structure of revenues and costs for the enterprise delivering that value."[4] The business model concerns the logical structuring of all business components into a value-creating process, but it is not the business plan itself. Instead, a business plan contains, among other things, a description of the logic of the business model. This allows communication of the opportunity's value-creation potential to external parties, including investors.

Does the entrepreneur have an attractive opportunity that deserves the investor's attention? To answer this fundamental question, it helps to have a framework for evaluating the business opportunity, for understanding its business model, and for identifying the major business risks. A wide variety of frameworks are available to investors, ranging from more intuitive reasoning all the way to formal evaluation schemes. In this book we introduce our own, the Venture Evaluation Matrix.

2.1.1 The Venture Evaluation Matrix

A good evaluation framework needs to be based on fundamentals, should provide a comprehensive analysis, and ought to be easy to use and communicate. For this we introduce the Venture Evaluation Matrix, sometimes abbreviated to VE Matrix. We derived this proprietary framework ourselves, combining our knowledge of a considerable body of academic research, with decades of close personal interactions with practitioners. The framework is therefore grounded in academic fundamentals, drawing in particular on the entrepreneurship, strategic management, finance, and economics literature. At the same time, the framework is based on extensive observation of the practical difficulties that entrepreneurs face when pitching their ideas and that investors have when evaluating those ideas. The framework uses a matrix structure to

highlight the logical connection between the main points of analysis. Figure 2.1 shows the VE Matrix.

Venture Evaluation Matrix	Customer	Company	Enterpreneur
Value Proposition	Need	Solution	Team
Industry	Market	Competition	Network
Strategy	Sales	Production	Organization

Figure 2.1. The Venture Evaluation Matrix.

The three columns identify the key players that define the business opportunity: the *Customer,* who has a need; the *Company,* which provides products or services to satisfy the customer's need; and the *Entrepreneur,* who pursues the opportunity. Relating this to economic fundamentals, we note that the analysis in the Customer column focuses on demand side factors, the analysis in the Company column focuses on supply side factors, and the analysis of the Entrepreneur column focuses on the people who bring demand and supply together. We can use a common analogy to interpret this in terms of horse racing. Focusing on the *Entrepreneur* is like betting on the jockey; emphasizing the *Company* is like betting on the horse; and concentrating on the *Customer* is (with a slight stretch of the analogy) like betting on the racetrack.

The three rows identify three fundamental perspectives for evaluating business opportunities. The *Value proposition* perspective describes how the company hopes to create economic value. This provides a *micro* perspective about what the company is doing at its core. The *Industry* perspective characterizes the environment within which the company operates. It takes a *macro* perspective of looking at the broader context that will affect the company.[5] The *Strategy* perspective explains how the

company plans to capture the value it creates and thus generate profits. It is concerned with the process of how the company plans to establish itself, thus taking a *dynamic* perspective.

Let us briefly consider the results from a survey of venture capital firms conducted by Gompers, Gornall, Kaplan, and Strebulaev.[6] When asked about their most important criterion for selecting investments, 47% answered it was the team, which corresponds to the *Entrepreneur* column. Another 13% answered product and 10% business model, which corresponds to the *Company* column. Moreover, 8% answered market and 6% industry, which corresponds to the *Customer* column. Of the remaining answers, the most important was investor fit (14%), which we will address with the MATCH tool explained in Section 7.3.3. Interestingly, only 1% considered valuation the most important criterion. This does not mean that valuation is irrelevant, but it suggests that before looking at financial deal aspects, investors first want to get comfortable with the business fundamentals.

To properly understand the VE Matrix,in Sections 2.2 and 2.3 we discuss a large number of economic, business, and strategy fundamental concepts. In Sections 2.4 and 2.5, we then show how to practically apply these concepts. In order to make the discussion of the fundamentals more accessible, Section 2.1.2 first introduces the WorkHorse case study.

2.1.2 The WorkHorse Case Study

To illustrate how to use the VE Matrix, we will use a running example. In fact, this running example is the beginning of a fictional case study that will accompany us throughout the book. We purposely use a fictional example because it enables us to illustrate a maximum number of pedagogical points. However, the case study is very realistic and can be thought of as a compendium of the experiences of many entrepreneurial companies. The choice of characters is meant to capture the global nature of modern entrepreneurship. Each segment of the case study will be placed in a separately numbered insert. WorkHorse Box 2.1 is the first one.

WorkHorse Box 2.1 Introducing WorkHorse

Astrid Dala put down her iPhone with a slight tremble in the hand. She had just shattered her mother's dream of raising a daughter who would one day win the Nobel Prize in Physics. She had called her mother in

Sweden from Ann Arbor (Michigan, US) to tell her that she had quit her doctoral studies at the University of Michigan (UofM). She was starting a company with three friends. Brandon Potro was an MBA student at the UofM, who had been thinking of becoming an entrepreneur ever since watching movies about Steve Jobs. It was the summer of 2019, his MBA was drawing to a close, and he quickly became excited when he heard Astrid's idea. Bharat Marwari, Astrid's brilliant lab colleague, was more cautious and needed some convincing. Being the only family member to ever attend university made him the pride of his family. He hadn't mustered the courage yet to tell his parents about the start-up. Finally, Annie (Xinjin) Ma had come to the UofM after finishing her engineering undergraduate at Shanghai Jiao Tong University. For her, university was just a preparation for doing something practical. The start-up was a big relief for her: "finally something real."

Astrid's idea was to build a new portable solar power generator. Based on technological breakthroughs in solar technology from her lab, she thought they could design a lightweight portable generator with a capacity for medium-sized electrical devices, such as air conditioning units, microwave ovens, electric chainsaws, and so on. In her childhood days in Sweden, Astrid had often been camping and had wished for a power supply to use simple devices such as electric stove or fans. She shared her idea with Brandon, whom she trusted not only as a friend, but also as a hard-nosed businessman. She was encouraged by his enthusiasm. Upon his recommendation, she brought Bharat into the conversation. He was by far the smartest scientist she had ever met. As for Annie, Astrid initially met her at a riding event. Both were members of the UofM's riding club, and both shared a passion for horses. Ironically, Brandon had separately met Annie at a Hackathon held at the business school's entrepreneurship center. He remembered her for her practical "duct tape" approach of solving engineering problems. When he suggested bringing her along to an early brainstorming session, Astrid was immediately enthusiastic, though Bharat seemed ambivalent.

In the following months, the four met regularly to further discuss the idea. Things started to come together when Brandon's uncle JP (for Juan Pedro) offered to invest $80K to help them get going. Brandon was weeks away from completing his MBA, Annie her engineering master's degree, and neither had a job lined up. Things were more difficult for Astrid, who had two more years before completing her

PhD. After weeks of soul searching and with some trepidation, she finally mustered the courage to call her mother and tell her that the four of them were starting a new company. Brandon and Annie did the same, but Bharat didn't think the time was right yet to tell his parents.

To name the new company, Astrid, Brandon, Bharat, and Annie, briefly considered using their initials, but then went for a less glamorous, more practical company name: "WorkHorse." They all shared an affection for horses and felt that the name reflected their energetic work spirit. Besides, their power generators would put amazing horse power to work.

Another exciting development was that Astrid had recently met Michael Archie. He was a wealthy UofM alum who had successfully sold his company a few years ago. He was now making angel investments in university-related start-ups. Michael was intrigued by the idea and the team and asked them to send over their business plan. The problem was that the four founders weren't exactly sure what Michael wanted. Brandon shrugged his shoulders; in the movies he had watched, Steve Jobs always just walked into the room and gave a passionate speech. Astrid realized that what they needed was a simple but comprehensive framework for presenting their business opportunity. Where to find that? She vaguely recalled her mother's last words of wisdom at the end of that difficult phone call. . . "Well, OK, do it if you have to, but at least make sure to use the Venture Evaluation Matrix."

2.2 Explaining the Venture Evaluation Matrix

We now explain the meaning of each of the nine cells. For each one we discuss the core issues that an investor would care about. In principle, one could write a whole book for each cell, but our goal here is to provide a concise summary of the core issues at stake. For each cell we identify three core questions that investors should ask, and then we explain the underlying issues that they are likely to be concerned with. The three questions are meant to capture core aspects relevant to most ventures, but they can be changed depending on the industry and stage of the venture, as well as investors' investment philosophies.

2.2.1 Need

The first row of the VE Matrix looks at the value proposition, basically how the company plans to create value. The first cell considers the customer need. Put simply, without a real customer need, there is no business opportunity. The three questions to ask are:

1. What exactly is the customer need?
2. How strong is the need, and how well do customers recognize it?
3. How much is the customer able and willing to pay?

The first question every entrepreneur always needs to ask is what the customer need is. Working on a solution without first understanding whether it solves a real problem is a mistake made by many entrepreneurs. Understanding the need is related to identifying the initial target customer. This is not trivial. To begin with, the entrepreneur typically has a hypothesis about what the customer's need might be, but this hypothesis needs to be tested. The initial premise often turns out to be false. The real need may lie elsewhere or may have different features than initially envisioned. Field Marshall Helmuth Graf von Moltke famously said that no military campaign plan survives first contact with the enemy. Steve Blank, who is associated with the lean start-up movement we discuss in Box 2.5, notes that "no business plan survives its first contact with customers."[7] As the entrepreneur learns about customer need, she may find that the initially hypothesized customer has a different need, or that the need is there but concerns a different type of customer. Too many entrepreneurs focus on solving what *they* believe is the customer's need. The risk is "forcing" a solution to an alleged need before verifying the real need in the first place.

The second question looks at how compelling the need is. Customers, be they people or organizations, have a hierarchy of needs. Certain things they require ("must haves"), some they consider valuable but not essential ("nice to haves"), others are pleasant but not really needed ("so whats"), and many are simply not needed at all ("junk"). In a consumer-facing business model (i.e., business-to-consumer or B2C), consumer psychology matters. The psychologist Abraham Maslow describes a hierarchy of needs, with physiological needs (e.g., food) at the bottom, then safety needs (e.g. security), followed by love and belonging (e.g., friends), esteem (e.g., status), and finally self-actualization (e.g., creativity).[8] Medical or agricultural innovations appeal to our physiological needs, whereas social media respond to a human need for belonging and esteem.

In the case of a business-facing model (i.e., business-to-business or B2B), different considerations come into play. Corporations seek profits and efficiency, so the entrepreneur needs to generate a return on investment for the corporation or satisfies other corporate goals. This means enhancing the company's sales, generating cost savings, or contributing to other corporate agendas (e.g., public relations). When dealing with large corporations or other complex organizations, it can be challenging to identify who the true decision makers are and what exactly their objectives are. Moreover, in some industries, the adoption process involves an interplay of multiple actors. Selling to schools, for example, might require the buy-in of school administrators, teachers, parents, educational thought leaders, government regulators, and maybe even students.

One important issue for entrepreneurs is whether customers actually understand their own needs. Individuals may lack self-awareness, and organizations often display resistance to new product adoption.[9] They may have gotten used to their problems, taking them for granted. They may reject a novel idea simply because they are unable to envision how it fits into their existing environment. Experienced entrepreneurs pay less attention to what customers *say* and more to what they actually *do*. Henry Ford reportedly said: "If I had asked people what they wanted, they would have said faster horses." Box 2.1 discusses observational methods that help entrepreneurs to distinguish between what people truly want, which is often different from what they say they want.

The third question concerns how much customers are able and willing to pay. Ability to pay is an economic question about disposable income for individual customers and about availability of budgets for corporate customers. Many needs remain difficult to solve because no one can afford to pay for a solution. This limits the opportunities for entrepreneurs, unless they find novel ways to overcome these challenges. Social entrepreneurs, for example, sometimes develop hybrid business models that combine the needs of different customers and organizations.[10] A well-known (though not uncontroversial) example is TOMS: for every pair of shoes sold at market prices, the company donates another pair of shoes to some needy children in poor countries.[11]

Apart from the economic ability to pay, there is also the issue of willingness to pay. Some wealthy customers see the rationale for buying healthy food but remain unwilling to pay a higher price for it. Similarly, corporate buyers may like a new human resources support service but need to ensure it squares with budgeting. Assessing the true willingness

to pay is often challenging, especially in the early stages of discovering customer needs. A customer's initial verbal enthusiasm may not reflect true intent. Until actual money is committed, true customer willingness remains uncertain.

WorkHorse Box 2.2 illustrates the Need analysis.

WorkHorse Box 2.2 Need

The four founders of WorkHorse had many heated debates about the customer need for their solar power generator. Astrid was an avid hiker and had wished many times to have a source of power on her long multi-day adventures. However, none of the available power generators were sufficiently small and light to fit into her back pack. Brandon had spent his summers in Canada by the lake and had noticed that families going on camping trips often needed a lot of power, especially if they wanted to maintain certain comforts, such as running microwaves or recharging phones. Bharat had a different take, arguing that poor people in India and elsewhere often could not afford to pay their electricity bills and would therefore look for alternative sources of power. Annie noted that solar power generators might also be useful to many of the smaller manufacturing outlets that she had visited in China.

While the four founders believed that all these customer needs would ultimately prove to be important, they agreed to focus on one customer need at a time. They decided to focus on outdoor vacationers, the private individuals who would need power on their outdoor adventures, be it hiking, camping, or other. As they researched the opportunity, they obtained three main insights. First, customer interviews revealed a keen interest in solar power generators. They liked not having to carry fuel and appreciated something small and lightweight. Second, customers had a clear idea of what they wanted. Surprisingly, they focused on design, as they wanted power generators to have an attractive look. They were put off by the functional looks of the diesel generator which they considered to be a work tool, not something to take on a holiday. Third, customers were willing to pay prices similar to diesel generators but were reluctant to pay a lot more than that. They focused mainly on the price of the generator and did not take fuel savings into account for purchasing decisions.

2.2.2 Solution

The second cell of the VE Matrix is about the solution to the customer's need, the direct counterpart to the first cell. Whereas the first cell looks at the demand side, the second cell looks at the supply side, asking how the entrepreneur intends to solve the customer need. At the core of every entrepreneurial venture is a proposed solution, a product or service that contains some innovation, that does something better than previous solutions. The innovations can pertain to scientific or technical progress, to advances in design or production, or to novel business models, such as opening up new sales channels, or novel marketing approaches. The three questions to ask about the solution are:

1. Does the proposed solution solve the customer's need?
2. How does the proposed solution compare to the alternatives?
3. To what extent can the innovation be protected?

The first question looks at the innovation from a business perspective, asking whether it actually solves any customer need. Some entrepreneurs begin with an innovation and then seek to make it relevant to the customer, others start with a customer need and search for a solution to address it. Either way the innovation has to provide an effective solution to a real customer need. Many entrepreneurs struggle with this problem, especially when they have a technical background. They get carried away with the challenge of the innovation but fail to ask hard questions about how useful it actually is to users.

Many technological advances never live up to the hype that surrounds their initial discovery. Artificial blood substitutes or graphene metals might be considered examples of that. A new technology may turn out to work only under limiting conditions, or it may be accompanied by undesirable side effects. Even if the scientific breakthrough is real, there is still considerable risk scaling a technology from the lab to an industrial application. In nontechnical industries, there can be a similar temptation to get overly excited about a novel idea. Juicero received over $100M in venture capital funding to create a high-end personalized juice machine, the "Nespresso of juicing, "selling at $700.[12] However, the hype never materialized into significant sales, and the company closed down a few years later. Juicero was an elegant product that actually didn't solve any real problem. A different approach is to take advantage of deregulation of traditional businesses. Flixbus was founded in 2013 to offer long-distance bus routes, initially in Germany and later across Europe. Its European success brought it to open a U.S. subsidiary in 2018. Flixbus

outsources bus riding to local companies and focuses on its technology platform. The company attracted five rounds of venture capital and in 2019 was considering an IPO.[13]

The second question suggests a comparison with alternative solutions. An innovation needs to be distinctly better than the existing solutions. Small incremental innovations typically don't stand a chance. Standing out requires that the innovation is clearly better than its alternatives in some important dimension, and it shouldn't be clearly inferior in other dimensions. Sometimes a technologically superior product loses out in the market because it is only better in a technical sense but weaker in terms of other relevant product attributes. A classic example is Sony's Betamax, which had better resolution and image quality than the competing VHS standard. It failed in part because it could only handle shorter movies. This did not meet the needs of movie studios, which wanted to fit an entire movie onto a single tape.[14] To compare a solution to its alternatives also requires looking at its economic viability. Sometimes a better solution doesn't work because it is simply too expensive to produce or its area of application remains too narrow. It could also be too expensive, either because of its cost or because it requires additional adoption costs—think of training employees to use a new machine. In addition, there is the question of longevity. Every innovation has a limited time horizon before it gets superseded by something better.[15]

The third question concerns the ability to protect the solution. There are two main ways of protecting innovations against imitation: (1) intellectual property (IP) rights such as patents, trademarks, copyrights, or industrial designs, and (2) strategic barriers to imitation, such as lead time or trade secrets.[16] If the solution is based on some IP, then the relevant issue is how strong the IP is. This depends on the nature of the technological advance and on the way the IP is defined. The quality of a country's legal enforcement also matters. However, even with good legal enforcement, it is sometimes difficult to protect the IP. This is because one can only protect the technology, not the solution itself. Competitors can find legal ways of imitating the functional benefits of the proposed solution without using any of the protected IP. Consequently, the second type of protection, namely, strategic barriers to imitation, ultimately matters most. The relevant issue here is whether the entrepreneur has some specific knowledge, skills, or complementary assets that help shield the solution from imitation, at least for some period of time. These

resources and capabilities protect the company best when they are difficult to replicate.[17]

In the context of the first two cells (need and solution), it is useful to briefly address a central issue in entrepreneurship, namely, how entrepreneurs come up with the right solutions that actually solve real customer needs. Box 2.1 briefly introduces design thinking and observational techniques, which are part of a modern entrepreneur's toolset.

Box 2.1 Design Thinking and Observational Methods

A common misconception is that entrepreneurs are inventors who discover the solution in a single Aha! moment. In reality, solutions are often found through an iterative process of experimenting across many different possibilities and taking in feedback from multiple sources. The design thinking movement has tried to provide some methodologies to the process of discovering solution. Design thinking is a broad concept that has affected a wide array of creative activities: from architecture to social work to innovation to business. There is no single definition of what design thinking is, but the founder of the Stanford Design School suggests the following four fundamental principles.[18] First, all design is human-centric; second, designers retain ambiguity to remain open to different forms of experimentation; third, all design is redesign, since technologies and social circumstances are in constant flux; and fourth, making designs tangible helps communication with others.

The actual design processes differ by application areas, but a common theme is that designers develop empathy with the user.[19] The designers need an intuitive, even visceral understanding of the problems they are addressing. A variety of tools can help entrepreneurs (or indeed investors) to better understand true customer needs. Anthropologists specialize in observing people of all walks of life, taking special care that their presence interferes as little as possible with truthful observations of human behaviors.[20] Entrepreneurs are increasingly adopting their techniques, directly observing customers, employees, experts, and others. Some observational techniques require physical observation, and others focus on online behaviors. There are also some ethical concerns one needs to be sensitive to, and some observational methods require consent.[21]

Design thinking and the related observational techniques make it clear that no solution can ever be found without staying close to the problem. This fundamental insight is also at the basis of the lean start-up movement, which we discuss in Box 2.5.

WorkHorse Box 2.3 illustrates the analysis of the Solution cell.

WorkHorse Box 2.3 Solution

WorkHorse's core technology was based on a scientific breakthrough in the way solar energy was captured with light rather than heat. The research had been led by the director of the lab, Dr. Daniela Dasola, but Bharat was behind several of the key scientific advances. The UofM technology transfer office took care of patenting the scientific discoveries, in time before the researchers published their research in a prestigious academic journal. In addition, Astrid, who worked in the same lab, had developed some lightweight materials that could substantially reduce the size and weight of the generators.

WorkHorse's planned first product was a small generator provisionally named WonderFoal, which was ideally suited for hikers. The intent for the second product, code-named NokotaStar, was a compact but substantially more powerful generator suitable for campers. The four founders were well aware of the dangers of developing products purely with a technical lens. They therefore started to adopt some design principles, spending time talking to potential users and where possible simply observing them using the existing products. Based on this observational research, the founders were confident that their product would constitute a clear improvement over existing solutions. Their solar generators were much smaller and lighter than standard diesel generators. Having noted people's irritation with the noise levels of traditional generators, they also ensured that their solution was considerably quieter.

While the technology and design were new and better than anything else available in the market, the founders worried that the technology could easily be imitated. Annie remarked that some of the manufacturers she knew in China could easily build something similar in a matter of months.

2.2.3 Team

A strong value proposition needs not only a clear customer need and a convincing solution, but also an entrepreneur who can implement the solution.[22] The third cell in the first row therefore looks at the entrepreneurial team. This is particularly important for those investors who prefer to "bet on the jockey rather than the horse." In this view, the most important asset of the firm is the human capital of the founders. In the words of Arthur Rock, one of the fathers of the VC industry: "Good ideas and good products are a dime a dozen. Good execution and good management—in other words good people—are rare."[23] The core argument is that a good idea alone is worthless if there is no entrepreneur to turn it into a successful company. The original idea behind Microsoft, for example, was nothing special, but Bill Gates turned it into something much bigger. Moreover, even if the initial idea is proven wrong, a good entrepreneurial team adapts until a viable business model is found. William Wrigley Jr. created a billion-dollar chewing gum business by recognizing that his customers valued the gum he was giving away as a promotional item much more than the soap he was trying to sell. Twitter was born when iTunes destroyed Odeo's business model. A team inside Odeo consisting of Jack Dorsey, Noah Glass, Biz Stone, and Evan Williams brainstormed together and came up with the idea for Twitter. In all these examples, the biggest credit goes to the founder team, not to the idea.

The third cell of the value proposition row therefore looks at the entrepreneurial team. The three questions to ask are:

1. Do the founders have the required skills and experience?
2. Do the founders have sufficient motivation and commitment?
3. Is the founder team complementary and cohesive?

The first question concerns the skills and experience of the founders. Something every investor wants to know about the entrepreneur is whether she has done this before. Box 2.2 reports results from academic studies that look at the role of prior entrepreneurial experience.

Box 2.2 The Importance of Being a Serial Entrepreneur

Entrepreneurs who previously founded a company are commonly referred to as serial entrepreneurs. Several academic studies compare the experiences of serial entrepreneurs with those of novices. One study of VC-backed start-ups by Gompers, Lerner, Scharfstein, and Kovner

finds that previously successful serial entrepreneurs had a success rate of 30%, compared to a success rate of 22% for previously unsuccessful serial entrepreneurs and 21% for first-time entrepreneurs.[24] The study also suggests that the higher success rate of serial entrepreneurs is related to their ability to time the market correctly.[25]

Do investors appreciate serial entrepreneurs? Another academic study by Hsu finds that serial entrepreneurs (especially successful ones) have a better chance of receiving funding than novice entrepreneurs.[26] They also receive higher valuations, meaning that investors are willing to pay more for investing companies led by serial entrepreneurs (we explain valuations in Chapter 4). One surprising finding from a study by Bengtsson is that serial entrepreneurs often change investors from one venture to the next.[27] They have no problem doing so because all investors recognize the value of serial entrepreneurs.

In addition to prior entrepreneurial experience, investors pay attention to industry experience, as well as experience in key functional areas such as marketing, sales, or operations. Interestingly, many investors consider prior experience in finance or consulting largely irrelevant. Although many entrepreneurs acquire their experience at established corporations, investors also value experience at younger growth-oriented businesses, which are sometimes considered better learning grounds for managing disruptive technologies and business models.[28] In addition to prior experience, investors also look at the broader skill set, including relevant educational achievements.[29] Having an MBA is widely perceived as a plus, and technical founders benefit from showing evidence of advanced formal training. While specialization is important, at very early stages founders must also be able to adapt and be "jacks-of-all-trades."[30]

The second question concerns the founders' motivation and commitment. Making money is an important motivator of entrepreneurial activity. On its own, however, it can be a poor motivator. Financial rewards are uncertain and happen too far out in the future to motivate entrepreneurs on a daily basis. For that there needs to be enthusiasm for the underlying activity and the entrepreneurial process itself. Seeing such "intrinsic motivation" assures investors that the entrepreneurs will not give up in the face of inevitable disappointments and setbacks. Quoting again Arthur Rock: "I am looking for entrepreneurs who ask: 'How can I make this business a success'—not 'How do I make a fortune?' "[31] Furthermore, academic studies suggest

that entrepreneurs tend to be risk-tolerant, ambitious, and self-confident.[32]

In addition to being highly motivated, good entrepreneurs are infectious; that is, they inspire the people around them. How entrepreneurs talk to investors is clearly part of this ability to inspire, but investors also pay close attention to how entrepreneurs communicate with their customers or employees. Their communication style is an indicator of how effective they are within their own business environment and more generally how good they are in the process of mobilizing resources (see Box 1.1).

In this context, it is also worth mentioning the issue of integrity. Investors give the entrepreneur their money, so they need to trust them. It takes years to build trust, but it can be lost in seconds. Integrity means honest dealing and honest communication, regardless of how bad the situation is. Investors frequently seek the opinions of others about an entrepreneur, so integrity is not limited to the interactions with the investors, it also concerns the entrepreneurs' broader reputation in the community.

The third question looks at the team as a whole, how well the different founders complement each other; and how cohesive they are as a team. Having some diversity in terms of skills, both hard and soft, is beneficial to tackle the diverse set of challenges facing a new venture.[33] However, it is also important that the founders share a common vision and a common passion for the venture.[34] Every team can have some healthy level of conflict, although excessive conflict can ruin even the most promising venture. A red flag for investors is a serious sign of team discord.[35]

What about solo founders? The majority of technology start-ups have founder teams, but many companies are also started by a single individual.[36] Some investors might see this as a negative signal, worrying that solo founders are too control-oriented, unwilling to share decision making with others. Other investors argue that having a solo founder is fine, as long as she shows good leadership and is willing to listen.

It should be noted that an assessment of the quality of a team cannot be done in isolation but requires a simultaneous evaluation of the business challenges (Section 2.3.4). A medical device firm requires a different skill set than a mobile app. Similarly, an early-stage venture may require more creative types, whereas a later-stage venture may require more execution-oriented managers. Importantly, the team is

responsible for the overall direction of the firm and must therefore have sufficient breadth of skills to look after all aspects of the business.

WorkHorse Box 2.4 illustrates the Team cell.

WorkHorse Box 2.4 Team

The four founders brought different skills and experiences to the team, each contributing to the venture in distinct ways.

Astrid Dala was clearly the leader of the team. She had an undergraduate degree in electrical engineering from the University of Stockholm and had worked several years as an engineer at Ericsson before starting her doctoral studies in the U.S. In addition to being technically competent, she was highly organized and had excellent people skills. She worked hard, was always on top of things, and often helped others to reach their potential.

Brandon Potro had an undergraduate degree in political science from Arizona State University. Ever since being a volunteer with the U.S. Peace Corps, he had a special interest in international relations and business. Throughout high school and college he worked for several smaller businesses. As he spoke fluent Spanish, he often helped with imports from Mexico. After the U.S. Peace Corps, he spent two years working for a large U.S. media company. Brandon had a talent for numbers and loved investing in the stock market. He also reveled in talking to people and building relationships. His easy way of communicating made him popular with engineers and businesspeople alike.

Bharat Marwari studied undergraduate physics at the India Institute of Technology in Bangalore. He won a prestigious scholarship to study at the UofM for his PhD. He came from a poor background, and in order to support his family back home he accepted some scientific consulting work on the side. He found it interesting, but sometimes a bit mundane and distracting. He was shy and preferred to work alone but had a friendly and calm demeanor.

Annie (Xinjin) Ma had studied industrial engineering in Shanghai. She had worked part-time in various smaller manufacturing plants where she was faced with a wide variety of technical problems. Moving to the U.S. for her master's degree, however, had proven to be an entirely different challenge. Academia wasn't her cup of tea, and she often found herself impatient with what she considered slow ways of

doing things. She preferred a "quick and dirty" experimental approach of getting things done.

The four founders shared a common passion for using solar power to save the planet and improve people's lives. As a team they had established a clear division of tasks and started to develop good working relationships. However, they had not yet broached some of the more sensitive issues, such whether all of them would quit their studies or what the division of founder equity should be. So far, they hadn't hired any employees.

2.2.4 Market

We now move to the second row of the VE Matrix, which takes a broader industry perspective to examine the environment the company operates in. In the first row, we took a micro perspective and looked at the value proposition itself; in this second row, we adopt a macro perspective, asking how this value proposition sits within the broader industry context.

The first cell of the second row looks at the market. Recall that the first cell of the first row was about a qualitative understanding of individual customer needs. We now turn to a more quantitative analysis of the overall market. The three questions are:

1. How large is the target market?
2. How fast will the target market grow?
3. How will the customer adopt?

The first question looks at market size to define the scale of the opportunity. To estimate the size of the target market, we first need to understand what it is. This means looking at the scope of the relevant market. Suppose we were interested in some kind of a drone start-up. Are we interested in the entire market for drones or in just close-range drones? Two key numbers describe a market size at any point in time: the size of the overall market and the size of the target market. The first is a headline number that is often used to indicate the economic importance of the industry. However, this is not the relevant number for assessing the scale of the business opportunity. The second number is more relevant, indicating the portion of the overall market the company actually targets. The overall market can be subdivided into different segments in order to identify the target market. For example, the overall

market may be the entire drone market, and the target market the close-range consumer-oriented drone market. Companies may try to address several segments at the same time, or sequentially. Moreover, it is common for start-ups to "pivot" from one market segment to another (see Box 1.1). Note that the term *pivot* is commonly associated with start-ups that implement a change of strategy. While they take a new course, they do not abandon everything they have done up to that point.[37]

For simplicity we emphasize two numbers: overall market and target market. A popular business framework further decomposes the overall market into two numbers called TAM and SAM.[38] TAM stands for Total Available Market (or Total Addressable Market), and SAM stands for Serviced Available Market (or Serviced Addressable Market). TAM includes potential customers who have not yet been reached, whereas SAM only includes customers that are already served.

Within a target market entrepreneurs distinguish different sets of customers, asking themselves which ones they should focus on. This analysis forces them to be specific about the relevant subset of customers, a first step toward a focused sales strategy (Section 2.2.7). For example, a company may define its target market as the consumer-oriented market for close-range drones and will distinguish between high-end customers involving mostly specialist retailers and low-end budget customers involving mostly online sales. This analysis should also include the intensity of competition, which we examine in Section 2.2.5. Note also that the distinction of customers within a target market is the basis for estimating the product's market share, and ultimately revenues, something we discuss in Section 3.4.

The second question prompts us to look at market growth. Entrepreneurs often focus on changing markets where there is innovation and growth. The current market size is thus a misleading metric for market potential. We therefore need a framework for thinking about the likely evolution of the market. For this it is useful to introduce a simple model of market adoption that is based on the industry S-curve.[39] Figure 2.2 depicts such an S-curve.

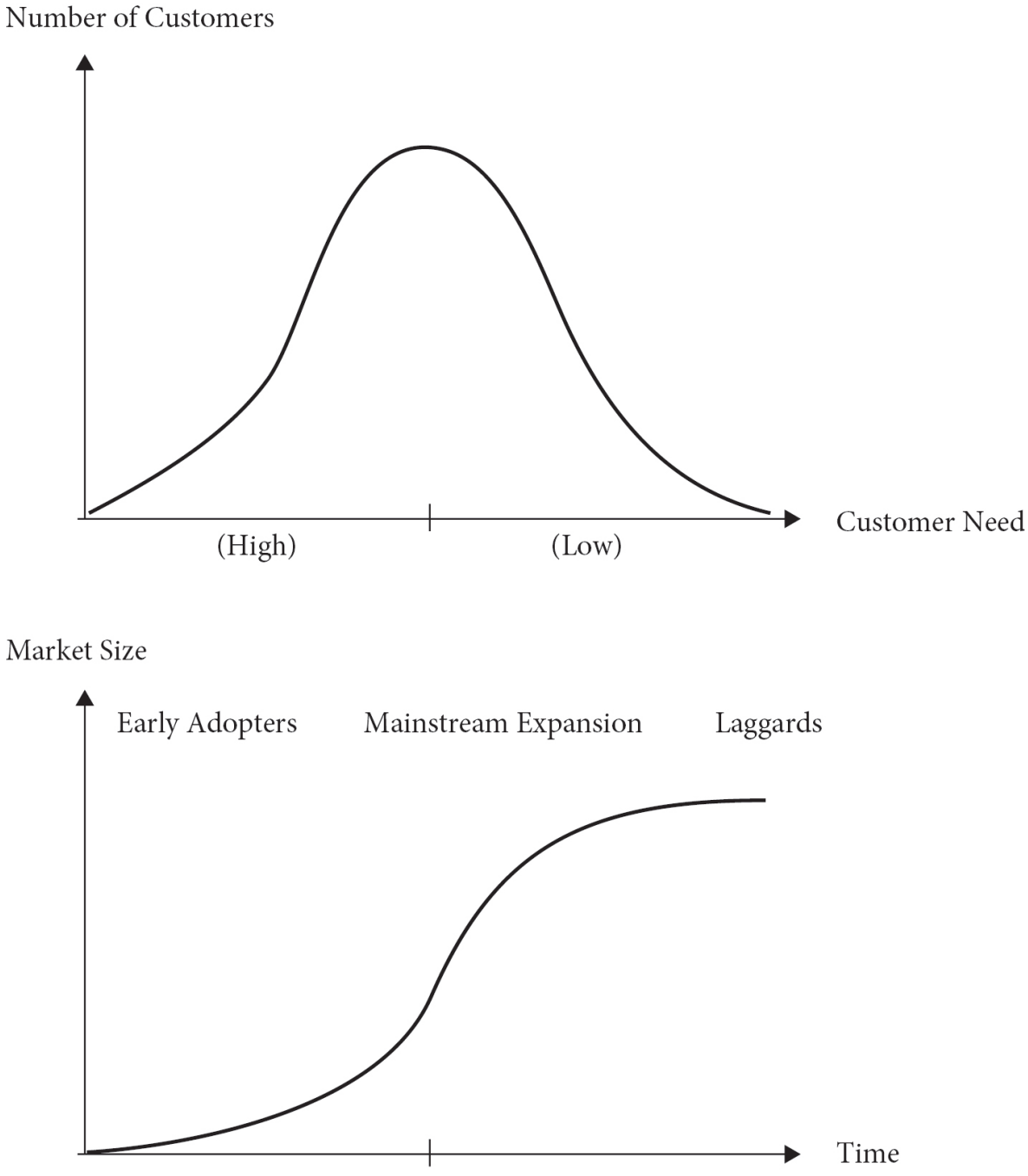


Figure 2.2. The industry S-Curve.

Consider a population of potential customers that have different needs for a new product or service. The upper graph in the figure shows the distribution of how much different customers value the product. For convenience we place higher value customers to the left. The highest value customers need the product the most and are the first to adopt it. If the value distribution has a bell-shaped distribution, then the growth of the market follows an S-curve, as depicted in the lower graph of the figure. The horizontal axis indicates time. The vertical axis shows market

size, which can be measured by revenue or number of customers. In the early days of an industry, market growth is slow as companies try to engage the early adopters. As the industry matures, the customer base expands substantially, generating rapid growth. In the upper graph this happens near the top of the bell-shaped curve, and in the lower graph this corresponds to the steep middle section of the S-curve. Eventually, the market gets saturated and growth slows down.

Figure 2.2 provides a useful, albeit highly simplified, picture of market growth. In reality, there is considerable uncertainty about whether and when the market will take off. Some new markets take off, some level off, and others fade away. For example, a new technology may challenge the dominant design of an existing industry. Either it establishes itself and becomes the new standard, or it fails to become the dominant design. It may then either find a smaller niche application or disappear altogether.[40] Also, there isn't just a single S-curve; instead the process starts again whenever an industry goes through another innovation cycle.

Timing the market is a key challenge for entrepreneurs. If they enter too late, others will already have seized the opportunity, but if they enter too early, they will fail to get traction. There is thus only a limited window of opportunity where entrepreneurs have a reasonable chance of success. This happens typically at the bottom of the S-curve, just around the time where it begins to slope upward. The problem is obviously that it is difficult to recognize when this happens. Most important, it is difficult to distinguish those opportunities where the S-curve takes off, versus those where it never goes anywhere.

Even if there are clear signs of the emergence of a new market, estimating its size and growth potential is far from trivial. How can you estimate the size of a market that does not yet exist? This requires projecting the size and shape of the S-curve without having reliable information about the underlying distribution of customer values. Such estimates are by their nature speculative and imprecise. Importantly, they are not based on actual data, but instead on indirect data extrapolation, typically using multiple data sources. The goal here is not to find a single right number but to find reasonable ranges. In Section 3.6.4. we explore this further in the context of sensitivity analysis.

The third question concerns the nature of the adoption process. In the context of the S-curve, this means asking who exactly the early adopters on the left-hand side of the bell-shaped curve in the upper graph are. In practice, the entrepreneur searches for potential customers that are

particularly eager. In addition to having a clear need, those early adopters have a willingness to take a risk on an unproven solution. This might require novel ways of segmenting the market, distinguishing customers not necessarily by their tangible characteristics (e.g., large versus small corporations), but by their behavioral characteristics (e.g., past track record of adopting innovations).

The details of the adoption process differ by industries. Particularly interesting cases are industries with so-called network externalities. These are industries where customers are more likely to adopt a product if many other customers are doing the same. Telephones are a classical example: a single telephone would hardly be useful; the value of a telephone line is increasing exponentially in the size of the network.[41] Social networks like Facebook or Tencent, or car-hailing companies like Uber or Didi Chuxing, are modern examples of services that become more valuable to each customer when the overall customer base grows. The adoption process in markets with network externalities can have tipping properties where small differences among competing platforms can swing the market one way or the other. In the end, the winner takes most of the market because once a critical mass of customers has adopted one platform, new customers also prefer that platform due to network externalities.[42]

WorkHorse Box 2.5 shows how to perform market analysis.

WorkHorse Box 2.5 Market

WorkHorse operated in the market for solar power generators but recognized this to be far too broad a market definition to be meaningful. For one, there was a very large segment for industrial generators that was irrelevant for the company. It therefore considered its relevant segment to be the consumer-oriented market for solar generators. It further segmented this market into portable versus stationary generators, and therefore defined its target market as the consumer-oriented market for portable solar generators. Within this, it identified two main geographic segments, a North American market (comprising the U.S. and Canada), and a European market (focused mostly on western Europe).

As part of market research, Brandon found out that the North American market for consumer-oriented solar power generators was estimated to be $1B in 2020. He estimated the portable segment of this

market to be approximately 10%, and therefore considered the North American target to be $100M in 2020. Experts estimated this market to grow at an impressive 30% for the foreseeable future. Based on this, Brandon estimated that the North American target market would grow from $100M in 2020 to $371M in 2025. Estimates for Europe were slightly harder to come by, given the more fragmented nature of the market. Based on various calibrations, Brandon assumed that the European market would be half the size of the North American market. However, he estimated it had an even higher growth rate of 35%. Brandon thus estimated the European target market would grow from $50M in 2020 to $224M in 2025. The total target market (comprising North America and Europe) was therefore expected to grow from $150M in 2020 to almost $600M by 2025. The table below shows his calculations.

Market size ($M)	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
North America						
Overall market	1,000	1,300	1,690	2,197	2,856	3,713
Projected target market share	10%	10%	10%	10%	10%	10%
Projected target market	100	130	169	220	286	371
Europe						
Overall market	500	675	911	1,230	1,661	2,242
Projected target market share	10%	10%	10%	10%	10%	10%
Projected target market	50	68	91	123	166	224
Total projected target market	150	198	260	343	452	595

The question of what customers would be adopting portable solar generators first remained a topic of debate. The four founders strongly believed that the outdoor hiking and camping market was full of eager early adopters but admitted that further market research was needed to confirm their hunches.

2.2.5 Competition

Entrepreneurial ventures can create substantial customer value but still fail to capture any of it. Competitors can drive prices down, take away market shares, and sometimes push innovators out of the market altogether. The Competition cell therefore asks who the competitors are and how they compete. No company is ever the sole provider of a solution to a customer problem; there are always direct or indirect ways in which other companies compete for the same clients. Moreover,

competition is inherently dynamic, so we need to consider not only current but also future potential competitors. The three questions to ask about the competition are:

1. Who are the current and future competitors?
2. What is the nature of competition?
3. How can the venture differentiate itself?

The first question is who the current competitors are. We distinguish two types of competitors: established corporations and other start-ups. Established corporations often appear to be fearsome competitors. Investors easily get cold feet when they hear that an Apple, British Petroleum, or Samsung might be competing in the target market. Yet it is easy to misunderstand the role of established corporations in the entrepreneurial ecosystem, for two reasons. First, while established corporations have more resources, they also tend to be inert, focused on selling their current product, and preoccupied with servicing their existing customers. Blockbuster did that when Netflix entered its market, and established airlines did that when low-cost airlines first challenged their business model.[43] Second, many established companies deliberately wait for entrepreneurs to prove the viability of new ideas. Many innovations are initially pursued by entrepreneurs, but once their product or service is taking off, established companies take notice. They are then faced with a build-or-buy decision. Either they enter the market and build up their own presence, or they acquire one of the start-ups already in the market. Microsoft, for example, built some of its new products, such as the Xbox, but acquired other important products, such as Skype. From the perspective of start-ups, the question is whether established corporations should be thought of as future competitors or potential acquirers.

In addition to established corporations, entrepreneurs should always expect competition from other entrepreneurs—current and future. For most start-ups it is safe to assume that somewhere else in the world there is some other entrepreneur pursuing similar ideas. When Mark Zuckerberg launched Facebook in early 2004, for example, it already had several other social network competitors, such as MySpace.com and Friendster.[44] In addition, one should always expect future entrants. Once the company has shown the viability of its own product, it should assume that a large number of imitators will try to replicate and improve on the company's success.

The second question looks at the nature of competition. Some industries witness fierce competition among rival companies, whereas others experience milder competitive behaviors. The degree of competition depends on many factors, including barriers to entry, the extent of differentiation, or the scrutiny of regulators. One important issue is the relative importance of price versus nonprice competition. In industries where the market is saturated and technology is mature, competition tends to focus on prices. In other industries there is substantial differentiation in nonprice features. In the earlier stages of an industry, nonprice competition often focuses on technology, customer segmentation, setting a dominant design, and product differentiation.

This bring us to the third question, which looks at how companies differentiate. This can happen through a distinct product offering, as well as a focus on specific customer segments. It matters because it is the basis of charging higher margins and moving the company toward profitability. In the beginning, start-ups often differentiate themselves through continuous experimentation and learning, rapid adoption of new ideas, and faster execution. Over time, the company finds a stronger identity in terms of its products and market niches.

Sometimes there is also the possibility of turning competitors into allies, coopting them by sharing the benefits of the innovation.[45] This may involve delegating certain activities to the competitor or sharing the product development process to create a superior product that is then jointly marketed. Cooperating with competitors remains a delicate issue that strategic management scholars study with great interest. Box 2.3 briefly looks at some of their key frameworks and insights.

Box 2.3 Competition and Cooperation Between Start-ups and Industry Leaders

The archetypal David and Goliath story is that a start-up challenges an established industry leader. After some initial challenges, the start-up outwits the giant and establishes itself as the new industry leader. There are several reasons why Goliath might lose. Incumbent leaders can be complacent and slow to respond. They may be reluctant to cannibalize their existing products and locked in to existing business models that make it difficult to respond.[46] Incumbents' core competencies also go hand in hand with "core rigidities" that make it difficult to change direction.[47] While each of these explanations can be fit to some

examples, there are also many other examples where the David and Goliath story doesn't apply. For one, many David actually lose in reality. Of particular interest to us, some Davids seek to cooperate with Goliath.

To understand how start-ups interact with established companies, let us first differentiate between the early-stage versus later-stage start-ups. At the later stages, established companies often acquire successful start-ups, precisely because they missed the new market. Facebook's $1B acquisition of Instagram is a case in point. The question we are interested in here is how early-stage start-ups compete or collaborate with incumbent leaders.[48] In principle, there are many benefits to cooperation. The start-up can simply slot itself into existing production, marketing, and distribution arrangements, thereby avoiding the costs of establishing it all by itself. The two firms might also collude on prices, thereby protecting their profits. This arrangement is unlikely to benefit customers, but given the small size of the start-up, it is also unlikely to attract the attention of antitrust authorities.

The main problem is that cooperation is not easy. An industry leader might take advantage of its position of power. In the process of setting up a cooperative agreement, the industry leader may obtain proprietary information about the start-up concerning not only IP (see Section 2.2.2), but also its customers, strategy, and other aspects of its business. The incumbent might use this information and break off the cooperation, or it might use a break-off threat to extract significant concessions from the start-up. One empirical study by Gans, Hsu, and Stern finds that cooperation strategies for start-ups are more likely when IP is well protected. [49] The study also finds that having venture capital funding helps start-ups broker deals with industry leaders.

Beyond the question of whether to compete or cooperate, there is the question of how to go on about it. One useful framework distinguishes between fast execution-driven business models versus ambitious control-oriented business models.[50] Consider first the case where the start-up decides to compete. An execution-driven strategy aims at disrupting the industry leader by being faster and nimbler, where the start-up remains focused on a specific and narrow value proposition. Netflix beat Blockbuster by focusing on an alternative distribution channel, first via mail and later via online streaming technology. A control-oriented strategy aims at creating an entire new product/service architecture that gives customers a comprehensive new solution. Uber's approach to competing against the traditional taxi industry is a case in

point. Consider next the case where the start-up cooperates. The control-oriented approach is to go the licensing route, where the start-up mainly provides IP. Dolby managed to build a significant company around its core IP portfolio. For many start-ups, however, the licensing strategy implies remaining small and narrowly focused on developing technologies. An alternative is an execution-oriented cooperation strategy, where the start-up contributes something specific to an existing value chain. The Indian outsourcing giant Infosys, for example, created a business model of working for industry leaders by providing specific low-cost services while ensuring not to disrupt their partners' core businesses. The contrast between a disruptive and a value chain strategy can also be seen in the automotive sector. Tesla clearly chose to disrupt the industry. At the same time, numerous less famous start-ups focus on providing specific new components to existing car manufacturers. Overall, we note that there are numerous ways for start-up to compete or cooperate with industry incumbents. Not every David battles Goliath.

WorkHorse Box 2.6 illustrates the analysis of Competition.

WorkHorse Box 2.6 Competition

WorkHorse's founders focused their competitive analysis solely on the solar product segment of the portable power generator market. They identified a large list of current competitors and an even longer list of potential entrants. To characterize the nature of competition, they found it useful to condense the analysis into a 2-by-2 matrix that identified four prototypical competitors. For each prototype, the table below lists one of the many competitors that WorkHorse had identified.

Competitors	Current	Future
Established players	Honda	Black & Decker
Start-ups	YouSolar	Chinese competitors

WorkHorse considered its product to be technically superior to that of all its current competitors, including Honda's popular models. Some of the current competitors, like YouSolar, were start-ups with a similar power performance. However, WorkHorse's design was considerably smaller and lighter. Yet the company was worried that several of the established players in the portable diesel generator market, such as

Black & Decker, might consider entering the growing solar product segment. Annie was also convinced that it was only a matter of time before Chinese competitors would flood the market with simple inexpensive solar generators.

WorkHorse thought that it had several ways of differentiating itself from the competition. First, there was the patented technology. Second, their device was smaller and lighter. Third, Astrid thought that WorkHorse's designs would be far more elegant and fun than those of her competitors. Unfortunately, it was not clear how long these advantages would last, given that technology improved continuously.

2.2.6 Network

There is an old wisdom that it matters less what you know than who you know. This notion also applies to entrepreneurs who rely on networks to build their ventures. Recall from Box 1.1 that the core challenges for the entrepreneur are to gather resources and manage uncertainty. Networks help them not only to access critical resources, but also to obtain information to de-risk the venture. The third cell in the industry row therefore looks at the founders' network. This cell tries to understand their position within the industry. The three key questions to ask are:

1. What is the reputation of the founder team?
2. What networks does the team have access to?
3. How does the team forge and maintain new relationships?

The first question concerns the reputation and professional standing of the team. Networks play a key role in building a new business, as they affect access to information and industry resources. Investors therefore check to find out whether the founders are well considered within their industry. With the rise of online social networks, investors also look at online sources for assessing the reputation of the team.

The second question concerns the current contacts of the founder team. Mapping the network provides information about how connected the founders are in the broader environment. In addition, start-ups leverage the networks of their close advisors. One of the key roles of a board of directors in entrepreneurial companies is to navigate networks to allow the company to access resources (Section 8.2.2). In addition, a board of advisors (sometimes also known as scientific advisory board) is meant to enlarge the company's network.

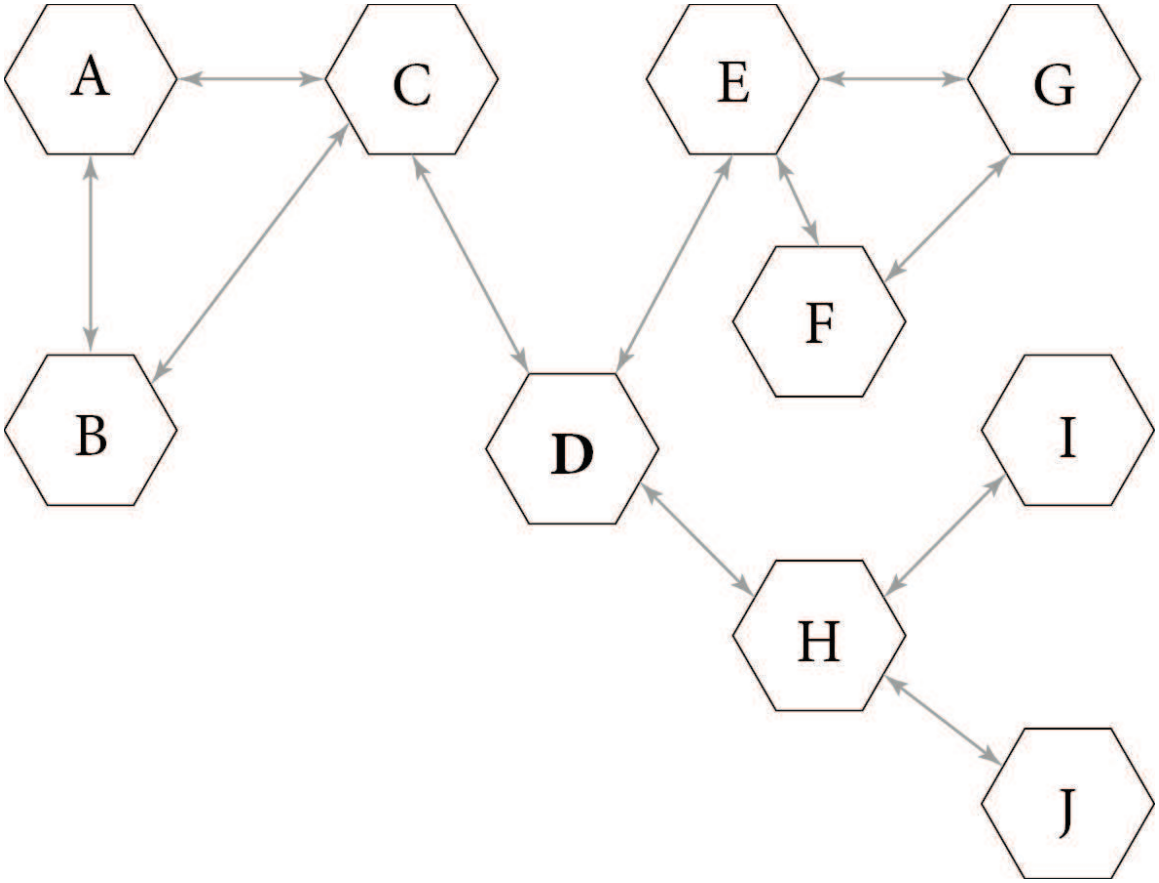
How can we make sense of the structure of a network, and how can we assess its quality? Box 2.4 discusses some of the core concepts from modern network analysis.

Box 2.4 The Structure of Social Networks

Some people might remember the classic Hollywood movie *Six Degrees of Separation*. The idea is that six connections are enough to reach anyone in the world.[51] In the modern world of online social networks (Facebook, Twitter, WeChat, etc.), it might seem even easier to connect with anyone in the world. The truth is a little more complicated than that, however, for having the right kind of network still matters a lot.

What kind of network ties are the most valuable? One classic study, by Granovetter, looks at the way professionals find new jobs. It found that the most important connections were loose acquaintances and coined the term the *strength of weak ties*.[52] Another classic study, by Burt, looked at managers inside large technology companies and asked whose ideas were most likely to be adopted. It found that the best ideas came from managers who were bridging different network clusters within the organization. They were less encumbered by group thinking within clusters and more able to broker ideas across clusters.[53]

To illustrate the properties of different network ties, consider the following simple graphical representation of a network. Many in this network (namely A, B, F, G, I, and J) only have two ties. They have a smaller network than those with three (namely, C, D, E, and H). Among those with three ties, however, D enjoys a special position. She bridges three distinct networks that have no other connection. Another way of seeing this is that each one that D connects with knows a distinct set of people. This contrasts with C, E, and H, who also have three network ties, but two of their ties already know each other, creating some redundancy in their network.



Beyond such a simple example, how can we systematically evaluate the quality of more complex networks? This is what network analysis does. It begins with simple questions such as who someone knows and who in turn they know. With this information it builds sophisticated mathematical measures of network centrality, that is, measures of the quality of network positions. The most basic measure is called degree centrality, which simply counts the number of direct ties in someone's network. An example of a more sophisticated measure is eigenvector centrality. This measure calculates the importance of one person by taking into consideration the importance of all the people she is connected with. Since this definition is inherently circular, the measure requires solving a large mathematical system to find what is called the eigenvalue. Google's PageRank measure uses an elaboration of this eigenvector centrality measure. In recent years, network analysis has gained additional prominence due to the rise of online social networks.

Networks are of particular importance for innovation and entrepreneurship because new ideas and investment opportunities often diffuse through them. Some networks are local in nature, connecting different types of people within a geographic cluster, that is, what we call an ecosystem (Section 14.1). Other networks help to interconnect

distant ecosystems with each other. One academic study by Shane and Cable looks at the fundraising success of technology entrepreneurs coming out of MIT.[54] It finds that being affiliated to a top university alone is not enough to receive funding. Instead entrepreneurs have to rely on their direct and indirect ties to find an investor match. Another study, by Sorenson and Stuart, looks at the structure of VC syndicates, that is, groups of investors investing in the same deal (Section 7.4). It finds that VC firms who are central within their local networks are also more likely to build bridges to more distant networks.[55]

The third question concerns the founders' ability to create and sustain relationships. As the company grows, new needs emerge. Rather than only looking at a team's existing relationships, one may question whether the team has the right inclination to go out and expand its network, making new contacts, and also maintaining relationships over time.

Networks matter for many aspects of company development. The sales process relies on generating new relationships with customers and intermediaries. Network connections may be essential to set up a meeting with actual decision makers or to create the right buzz in the target market. Networks also matter for hiring. Entrepreneurial firms typically pay below-average market salaries, so recruiting talent requires an ability to find employees who are not only capable but also flexible. Furthermore, a company often employs its network to access its specialized supply inputs. In high-technology businesses, this may include access to licenses that are required for implementing the company's own technology. Access to financing itself also depends a lot on forging new relationships. Finally, in regulated industries and in countries with a weaker rule of law, entrepreneurial firms also need to create network ties to secure the goodwill of government officials.

WorkHorse Box 2.7 touches upon its networks—or lack thereof.

WorkHorse Box 2.7 Network

WorkHorse's founders were still young and had only limited contacts in the business world. Each of them boasted a respectable following on Facebook, showing that they were truly respected and trusted by their friends. However, few of these contacts were valuable for starting a company.

In terms of advisers they thought of asking their lab director, Dr. Daniela Dasola, to join their board of advisers. As for a board of directors, they were hoping their investors would take care of that, since they felt at a loss how to do that.

Astrid and Brandon were keen networkers but sometimes hoped that their team mates would show the same willingness to go out, meet people, and follow up with them the way they did.

2.2.7 Sales

The third row of the VE Matrix takes a dynamic perspective by looking at strategy. This means looking at the future direction of the company. It is also closely related to implementation and to the momentum of the company.

The sales cell looks at how the company reaches its customers to generate revenues. The three key questions to ask are:

1. How does the venture reach its customers?
2. What is the distribution strategy?
3. What are the revenue model and pricing strategy?

The first question about the sales strategy is how the company gets in front of its customers. Based on analysis of the customer need and the market, in the two cells above, this cell focuses on the customer acquisition strategy. This concerns the company's approach to enter the market, not only in terms of physical access, but also in terms of customer attention. Many new products and services require at least some customer education and therefore some investments in developing a customer base. More generally, every product or service requires some marketing strategy that explains how the company will access the hearts and minds of its customers. In entrepreneurial companies, the marketing strategy frequently evolves as the company learns about its customers and as it expands into different market segments. For example, as the company grows, it may change its marketing from targeting early adopters who are happy to buy a product on the basis of its promises to targeting mainstream customers who require much more assurances before buying.[56]

The second question concerns distribution strategy. A key trade-off here is whether to sell directly or indirectly through third parties. Relying on third parties leverages the resources and reputation of established

players, whereas selling direct allows the company to better control the customer experience and to learn from direct customer contact. Commercialization through third parties entails higher variable costs due to commissions. Building one's own distribution network often requires higher initial fixed costs. Working with third parties involves some cooperation with established firms in the industry, which we discuss in Box 2.3.

The third question concerns the revenue model and pricing strategy. What exactly is the company selling, and what can it charge for? The basic challenge is to figure out who should and shouldn't pay and what exactly they are paying for. Establishing a revenue model requires understanding the many ways in which customers can try to obtain the same good for less. This is particularly salient in the online world, where users frequently find ways of obtaining content for free and are therefore unwilling to pay. Part of the revenue model concerns pricing. This depends to a large extent on the customers' willingness to pay—in economic parlance, the elasticity of demand. Pricing is also affected by the level of competition, discounting practices, and the company's ability to differentiate itself.

Another aspect of the revenue model concerns customer acquisition and retention costs. What does the company need to spend to get a first sale, and how often will that customer come back for further purchases? A useful concept here is the lifetime value of a customer, which compares the acquisition costs against the revenues on a per-customer basis, over the lifetime of a typical customer.

WorkHorse Box 2.8 illustrates the issues for the Sales cell.

WorkHorse Box 2.8 Sales

WorkHorse decided to target the consumer-oriented market for portable solar generators. It reckoned its ultralight design would be valued by outdoor adventurers and camping enthusiasts. Based on preliminary customer research, the company expected to be able to charge $580 (net of sales tax) for the WonderFoal. This put the company in the premium pricing category but not at the top of the range. The founders justified this choice on the basis of their better power performance and their superior designs. For the NokotaStar the company envisioned charging $780 (net of tax).

The company planned to enter the North American market in January 2021 with the WonderFoal product and add the NokotaStar in January 2022. For the European market, the company planned to introduce both products in January 2022.

Most consumers purchased power generators at a large variety of retailers. The company planned to focus on specialized sporting or camping goods retailers. WorkHorse realized that getting access to these retailers would not be cheap. Their conversations with a small number of sport stores suggested that retailers would take a 40% margin off the retail price.

Marketing was central to sales growth. The company expected that it could market the WonderFoal to enthusiastic hikers on its own. Reaching customers would not be easy, as the market was somewhat fragmented, but the best way to attract the attention of hikers was through word of mouth, specialty magazines, and online forums. However, marketing to campers would be considerably more challenging. Early market research indicated that, whereas hikers were willing to buy on the basis of superior product features, campers were considerably more focused on brand. They often bought their camping equipment as part of a larger purchase, also involving items such as large tents, trailers, and even camping vans. Consequently, WorkHorse planned to seek a co-branding partner that would help the company gain access to and credibility with these customers. The company understood that this would not be cheap and expected to pay another 20% margin of the retail price to such a co-branding partner.

2.2.8 Production

While the first cell of the strategy row is concerned with the customer-facing "front end" of the company, the second cell is concerned with the supply-facing "back end." We call this the production strategy, which broadly designates the strategy for structuring the company's entire value chain. This cell builds on the Solution and Competition cells above it in the company row, as the production strategy is finding a way to implement the proposed solution within a competitive environment. The three key questions to ask are:

1. What is the development strategy?
2. What is the scope of activities, and what partnerships are necessary?
3. How efficient are operations?

The production strategy covers a broad set of concerns about how the company needs to organize itself. The first question relates to the pre-production stage where the company is developing its technology and product offering. An immediate concern is how far along the development path a company has already traveled and how much further it has to go. Having a shorter path to launch makes the venture more attractive to investors. However, one should never expect a straight ride through the development process. Investors therefore often focus on identifying the next milestones and what the company needs to achieve in the short term.

In technology-based start-ups, the innovation is based in part on a scientific or technological breakthrough. Typically, further technological development is required before a product can become useful to customers. This may create conflicts between the marketing team that wants to quickly develop a solution to show the customer and get feedback versus the technical team that wants to develop a proper solution that validates its technical prowess. Put differently, managing the development strategy often requires juggling time schedules and making trade-offs between speed and quality.

The second question asks how the company structures its activities. A key issue is the scope of activities, that is, what the company plans to do itself versus outsourcing or co-developing with strategic partners. This question is relevant at both the development and production stages; at both of these stages the company needs to decide what activities it performs itself and what activities it delegates. This decision requires determining what assets are owned by the company itself and what assets are owned by third parties. All these decisions depend on the company's strategic vision of how it wants to build its core competencies.[57] Should the company purchase an inexpensive standard component on the market, or should it manufacture a better, more specialized component in-house? Should the company partner with another company that has complementary resources but may discover some of its proprietary information in the course of the project?[58] Some of these decisions are also driven by resource constraints. For example, start-ups typically don't own their real estate but instead rent it, and they prefer to lease rather than purchase equipment.

The third question relates to structuring operations. An important part of the operating strategy is to identify all the resources that are required for production, including physical assets, staffing, IP, and a variety of other inputs.[59] Another important part is to outline the cost model, which

explains how much it costs to develop and produce the product or service. Cost efficiency is particularly important for entrepreneurial ventures that rely on external funding. Whereas the sales cell lies at the basis of the revenue model, the production cell lies at the basis of the cost model. Together, they form the core business model. In Chapter 3 we show how to turn this into financial projections.

WorkHorse Box 2.9 illustrates the type of analysis for the Production cell.

WorkHorse Box 2.9 Production

WorkHorse's development was easy to describe but much harder to implement. Bharat was in charge of all technological developments. It was agreed that he should also continue to do his own research. This area of technology was evolving rapidly, and the team was partly betting on his future scientific discoveries to stay ahead of the competition.

The design work was to be done under the leadership of Astrid. The founders thought that they could develop the prototypes by themselves, most likely with the help of some local talent. All hardware production, however, was to be done in China, under Annie's supervision. To prepare for the product launch, she planned to move to China, to identify suitable manufacturers, and to forge relationships with relevant parties in business and government. The company still had to work out various details about its cost model, to get a proper understanding of how expensive development and manufacturing would be.

2.2.9 Organization

The final cell concerns the organization, once again focusing on the human elements. The analysis here builds on the sales and production cells in the strategy row but focuses on the managerial aspects of strategy and how the founders create an entire organization that can deliver on the proposed strategy. It is therefore also related to the cells above in the entrepreneur column, by looking at how the Team and its Network evolve into a professional organization. The three key questions to ask are:

1. How will the founder team expand and evolve?
2. What is the governance structure?
3. What is the talent strategy?

The first question concerns the way the entrepreneurs approach leadership. Founders typically have skills and passions that help the company survive through the early days. However, as the company grows, the roles of leaders change. Two key issues need to be addressed. The first issue concerns what is missing in the current founder team. This means looking at the future strategic needs and at where the holes are in the current team. The second issue is how to make the best use of the talent within the current team. As companies grow, good entrepreneurs do not always become good managers. Stories about charismatic founders such as Walt Disney, Jack Ma, Richard Branson, or Jeff Bezos tend to obscure the fact that the majority of company founders are replaced by outsiders in the position of CEO within a decade and often much sooner than that.[60]

Discussing leadership issues can be sensitive, involving delicate personal questions such as: "When will the founders be ready to relinquish control to a new set of managers?" Or "What would be the best role for this founder?" Investors worry when founders are more interested in retaining control than in growing a successful business. The simple truth is that investors care about the success of the company, more than the personal success of the entrepreneur.[61]

The second question concerns corporate governance: "Who decides what, and how?" Organizations have both formal and informal decision-making structures (Section 8.2). The board of directors plays a central part in the formal structure, as it approves all key strategic and financial decisions. The composition of the board, and the way it operates, therefore influence the future direction of the company. In addition, many informal aspects influence decision making. In some start-ups, strong-minded founders dominate all decision making, sometimes to the detriment of the company. In other start-ups, decision making is more decentralized, involving extensive communication. Such organic processes can lead to better decisions but are prone to be slow and political.

The third question is how the company plans to attract, nurture, and retain talent. At an early stage, there is often a need to complete the team, and as the company grows there are ongoing challenges of developing competencies within the company. For example, launching

exports requires hiring managers who have experience with foreign markets. All of this requires not only hiring well, but also nurturing employees and ensuring that the good ones are retained. Like any other company, start-ups compete for talent (Section 14.4.2) and often find it difficult to offer convincing career prospects, let alone attractive compensation plans. As the company grows, there also has to be a balance between external hires and internal promotions.

Another important and related issue is which corporate culture the venture wants to develop. This concerns the set of beliefs about the behavior of others inside the organization that develop collectively as the company grows.[62] Culture is mostly formed at early stages of the company and is strongly influenced by the founders and their initial approaches to overcoming external challenges and internal problems. It further evolves over time as the company learns to compete in the marketplace and faces the numerous challenges of growing the organization. Corporate culture defines how employees and senior managers communicate, what values matter within the organization, and how it will respond to external and internal pressures.[63]

WorkHorse Box 2.10 illustrates its organizational approach.

WorkHorse Box 2.10 Organization

Astrid recognized that a team of four founders in their 20s on their own would not look credible to investors and others. Yet she didn't think that the company was in a position to hire a more experienced CEO. She had her doubts that bringing in an outsider would be the right thing for the team, at least not at this early stage. Besides, she rather enjoyed being the CEO, and so far, everyone thought that she was doing a fine job.

One concern was that, despite her enthusiasm for it, she really wasn't an industrial designer. She was even more nervous about the fact that no one had any sales experience. She earmarked those two as key areas for future hires. Astrid was also keen to build a proper board of directors but had no experience with it, and hoped investors could guide her on this.

From the start, the four founders agreed that their company should be professionally run. They planned not to hire friends and family, but to attract and retain the people who were right for the job and right for the company. They would always require unanimous agreement on any key

hire and would always check that candidates fit not only the job profile, but also their work culture. They decided that talent and attitude were more important than skills and experience.

The four founders established some fundamental corporate values they would live by. They summarized them as their HORSE values, which stood for:

- **H**appy is the way we work
- **O**rganize around teams, don't try to go solo
- **R**espect the environment and all the people you work with
- **S**ell something that the customer actually wants
- **E**xperiment and learn from it

While Brandon thought of it as a brilliant way of projecting the company values, Bharat insisted that merely putting together nice statements wasn't enough. He was wondering what it would take to actually live by these values once the going gets tough.

2.3 Drawing Conclusions from the Venture Evaluation Matrix

The VE Matrix is a method for evaluating opportunities based on nine logically connected criteria. The benefit of such a structured approach is that it facilitates drawing conclusions about the prospects of the underlying business. Specifically, the three rows of the VE Matrix provide three distinct perspectives on the attractiveness of the opportunity. The three columns imply three types of potential competitive advantages. The following section explains this in greater detail. Figure 2.3 shows how the VE Matrix generates these summary insights.

Venture Evaluation Matrix	Customer	Company	Enterpreneur	Attractiveness
Value Proposition	Need	Solution	Team	Value
Industry	Market	Competition	Network	Scale
Strategy	Sales	Production	Organization	Grow
Competitive Advantage	Access	Entry Barriers	Competencies	Decision

Figure 2.3. Summary evaluation with the Venture Evaluation Matrix.

2.3.1 Three Perspectives on Attractiveness

The rows of the VE Matrix look at the attractiveness of the business opportunity from three distinct perspectives. The value proposition row uses a *micro perspective* that focuses on what the company plans to do, thereby looking at the potential value of the opportunity. The industry row takes a *macro perspective* that allows us to understand the environment within which the company operates, thereby looking at the potential scale of the opportunity. Finally, the strategy row takes a *dynamic perspective* of gauging the company direction, thereby looking at its growth potential.

Each of these three perspectives allows us to answer a different set of questions about the underlying business opportunity. The first (micro) perspective permits us to assess whether the opportunity constitutes a promising starting point to create value for the customer. Have the entrepreneurs identified a real customer need, do they have a chance of providing a solution, and are the entrepreneurs themselves capable problem solvers who can deliver? The entrepreneur's answers to these questions should assure the investors that there is a substantial value potential.

The second (macro) perspective looks at whether the opportunity is in an attractive industry that is worth investing in. This requires a

sufficiently large market to allow for substantial value creation. The competitive structure has to be sufficiently favorable to allow the company to capture a sufficient market share. Moreover, the company needs a strong network to access the required industry resources. This row therefore deals with attractiveness of the environment, addressing investor concerns about the scale of the undertaking.

The third (dynamic) perspective addresses the question of whether the company is heading in the right direction for achieving sustained growth. Does the company have a suitable strategy for selling into the market? Does it have the right approach for developing its products and managing its operations? Is there a workable business model? And is there a professionalization plan for building a capable organization that can grow? Answering these questions allows the entrepreneur to address investor concerns about the company's overall strategic direction and about whether it knows not only how to create value but also how to capture it to its advantage.

2.3.2 Three Competitive Advantages

At the onset, start-ups do not possess competitive advantages but rather only an ambition to develop them over time. The three columns of the VE Matrix allow us to identify what types of competitive advantages the company may develop over time. From the first column of Figure 2.3 we see that the first potential competitive advantage concerns access to customers. The underlying force is customer loyalty; that is, having the attention and trust of a customer gives the company an edge over the competition. Many start-ups hope to establish market access by being a first mover. They hope to build a reputation with the end users for quality, service, affordability, and other assets. Reputation manifests itself in a variety of forms, such as trust, institutional relationships, or brand image. A good reputation helps to attract new customers and retain existing ones. Early movers are well positioned to create a distinct reputation with their customers, creating psychological, organizational, technological, or contractual switching costs that put the company ahead of its competitors. Once customers have downloaded one app for transferring money from their mobile phone, such as TransferWise or OFX, why switch to another?

Being an early mover is also challenging, however, and doesn't guarantee reputational advantages. Early movers may enter with an immature technology that fails to satisfy customers. They may execute

poorly and fail to establish customer trust. Palm's Treo was an early mobile phone with color touchscreen but was soon beaten by lighter models. Moving early can even turn into a disadvantage. Sometimes competitors benefit from the pioneering efforts of a start-up. They follow the trail blazed by the pioneers and learn to avoid their mistakes. Being a first mover only provides an opportunity, but no guarantee, to establish market access.

This brings us to the second competitive advantage, barriers to entry, which Figure 2.3 shows at the bottom of the second column. While access is fundamentally concerned with the front-end customer-facing part of the company, entry barriers are related to the back end of the company. We define entry barriers as proprietary assets that the company can use to block the competition. Some can be physical assets, such as a favorable retail location, or an efficient production plant; others are intangible assets, including IP (Section 2.2.2), as well as licenses, contracts, or relationships. For example, a company may benefit from owning a particular government license, or it may benefit from having an exclusive relationship with a key partner.

While proprietary assets create some entry barriers against the competition, these are rarely absolute barriers. Competitors will seek alternative ways of getting around these barriers and will try to build their own proprietary assets. Entry barriers do not appear coincidentally; they are deliberately created as part of the competitive process. They are the result of companies' technological innovations, competitive strategies, and the way they set up their production processes.

The third column in Figure 2.3 shows Competencies as competitive advantages. These pertain to the talent, knowledge, and skills that reside within the organization. Competencies may belong to a specific set of individuals, such as an all-star sales team. They also manifest themselves in the corporate culture. Some corporations perform better because they know how to motivate people. Of particular significance here, some companies have an organizational culture that is open to "intrapreneurial" initiatives and corporate change. This gives them a dynamic capability to continuously improve their own products and processes.[64]

The seeds for creating competencies go all the way back to the founding conditions. The original cultural imprint is the basis from which the organization will develop. Consciously or not, start-ups often adopt the organizational routines of the companies the founders worked in prior to starting their own venture. These routines then affect the way

that start-ups grow and change over time.[65] A functional blueprint can generate organizational competencies that constitute a competitive advantage, but a dysfunctional culture can derail even the most promising business opportunity. The ability to create and maintain competencies depends on the leadership of the company, and thus the talent it manages to recruit and retain. The analysis of the third column therefore leads to an evaluation of the competencies that a company is likely to develop over time.

2.3.3 Assessing Risk

The VE Matrix uncovers the business risks associated with a new venture. Each cell of the Matrix contains elements of business risk—for example, the risk of being exposed to strong competitors. Beyond a list of all the individual risks, investors want to understand the broader pattern of risk. This is where the matrix structure quickly generates an overview of a venture's fundamental business risks.

We first look at risks along the columns. The flipside of competitive advantages are competitive weaknesses that can bring companies down. We identify three types of risks: market risk, technology risk, and people risk. Market risk, in the first column, arises from the possibility that the customer need is not strong enough, that the market is not large enough for a viable business, or that the company fails to reach its customers. Technology risk in the second column arises mainly from the possibility that the proposed solution to the customer problem fails on technical grounds. Beyond such technical aspects there are also broader concerns about the underlying innovation. The innovation may not be protected from competition, or the entrepreneur may fail to successfully deliver a product or service to the market. Finally, the third column reveals people risk. This arises from possible weaknesses within the founder team, their networks, and their ability to grow the organization.

We can also identify risks along the rows of the VE Matrix. The first row shows that the venture may fail to create enough value. This can be because there is no real customer need and no proper solution, or because of an inadequate founder team. The second row points to the risk that the venture is limited in scale. This may happen if the market turns out to be small, if powerful competitors erode too much market share, or if the founders' network is insufficient. The third row shows the risk that the venture fails to capture economic value and is unable to generate profits. This happens if the revenue model and the cost model

do not allow the venture to capture the value it creates, or if the founders fail to create a capable organization.

2.3.4 Interactions Across Cells

For simplicity we discuss the nine cells of the VE Matrix as nine independent entities that can be summed up across rows or columns. In addition, we note that there are interesting interdependencies across cells. In principle, there can be 36 pairwise interactions across the nine cells in the VE Matrix. There is no point in listing them all, but consider the following two examples. One example is Sales and Competition. They appear in different rows and columns but are still related. Put simply, the less competition, the easier to grow sales. Another example is Need and Organization, which appear on opposite ends of the VE Matrix but are interdependent. Certain corporate customers, for example, have a need for reliability and efficiency, which requires the start-up to develop a formal management organization. By contrast, other customers value creativity, encouraging the entrepreneur to create a more flexible and informal organization.

There are numerous more examples of how the cells interact with each other. Entrepreneurship scholars who study how entrepreneurs perceive and pursue opportunities emphasize several important interactions. One important concept is the "individual—opportunity nexus."[66] The argument is that entrepreneurial opportunities are not valuable by themselves, but they become valuable when undertaken by the right individuals. Interesting evidence from cognitive psychology experiments suggests that individuals respond differently to idea triggers, depending on their prior knowledge and motivation.[67] Closely related is research about what kind of entrepreneurs fit with what kind of opportunities. One study by Eesley and Roberts compares the role of entrepreneurial experience versus talent.[68] It finds that prior experience increases performance in start-ups that are operating in familiar markets and technologies. However, talent becomes more important for more novel and unfamiliar opportunities. Overall, we note that there are important interactions across cells and that evaluating an opportunity is not limited to looking at each of the nine cells in isolation, it also means looking at how the different cells fit together.

2.4 How Entrepreneurs Use the Venture Evaluation Matrix

2.4.1 The Entrepreneur's Decision

The bottom right cell in Figure 2.3 says Decision. The analysis of the VE Matrix ultimately assesses the overall prospect of the venture and therefore provides a key input into decisions made by entrepreneurs and investors. In this section, we look at how an entrepreneur faces a continuation decision, and in Section 2.5 we turn to the investors' investment decision.

Recall that in Box 1.1 we established three fundamental principles of the entrepreneurial process: entrepreneurs need to gather resources, they face considerable uncertainty, and they experiment to find a path toward a viable business. Thinking of the entrepreneurial process as a learning process helps to explain how entrepreneurs can use the VE Matrix. At each major junction of the entrepreneurial path, the entrepreneur faces a three-way decision: (1) continue with the current plan, (2) pivot to a different plan, or (3) abandon the project altogether. The VE Matrix can guide these decisions.

If the analysis of the VE Matrix generates a coherent and positive outlook, then the entrepreneur can continue with the current plan. The VE Matrix also suggests next steps. Where is the uncertainty greatest? What hypothesis should the entrepreneur test now? Ironically, it is often the difficulty that an entrepreneur has answering the questions in a cell that reveals where the uncertainty is greatest and what the next step might be.

If the analysis of the VE Matrix generates an incoherent or mixed outlook, then it may be time to pivot and adjust the strategy. The VE Matrix provides guidance on which parts of the plan should stay and which parts need to change. For example, typical pivots in an early-stage venture consist of staying with the customer need but looking for an alternative solution; or staying with a technology but looking for an alternative customer need; or even staying with a customer need and solution but looking for a different team to implement. The VE Matrix disentangles the different components of the business and therefore helps to identify which parts can be kept and which ones need to be changed.

If the analysis of the VE Matrix generates a distinctly negative outlook, then it may be time to abandon the opportunity altogether. This is particularly important at the very beginning, when the entrepreneur has to decide whether or not to pursue the venture in the first place. The VE Matrix can identify red flags, such as the lack of real customer need, or the presence of invincible competitors. It may also expose

irreconcilable discrepancies. There may be a misalignment between the third column and the rest, indicating that the opportunity may be promising, but it simply doesn't fit the team.

Box 2.5 explains that the three-way decision between continuing, pivoting, or abandoning is consistent with what is commonly known as the "lean start-up" methodology.

Box 2.5 The Lean Start-up Methodology

The lean start-up is a popular way of approaching entrepreneurship. There is no single definition of what it entails, but the core messages are fairly clear. A lean start-up approach aims to make venture development efficient through experimentation and learning. It focuses on the early stages of venture development and prioritizes flexibility and speed. These core principles are well aligned with the three fundamental challenges of entrepreneurship identified in Box 1.1.

Eric Ries, a central figure in the lean start-up movement, describes the following process.[69] Starting with an idea, the entrepreneur builds a "minimum viable product" (commonly abbreviated to MVP). This is not a finished product; instead it is a mock-up or prototype that is much cheaper to build. It is just good enough to be shown to potential users for some trial (for example, a highly incomplete version of a software). The lean start-up methodology then emphasizes the need to measure the outcomes from such trials. The data generate new insights about the fit between customer needs and the MVP. Often this results in a pivot, where the entrepreneur decides to refocus her value proposition. Instead of simply developing a finished product, the entrepreneur develops a new MVP and restarts the learning cycle. This cycle is repeated until user feedback is sufficiently positive to justify going into full product development.

Steve Blank uses another closely related framework that emphasizes the importance of customer focus.[70] It starts with a process of discovering who the initial customers are (i.e., the early adopters discussed in Section 2.2.4). Blank suggests formulating hypotheses of what exactly different customers want and then validating them by talking and listening to customers. For this entrepreneurs can use the design thinking methodologies discussed in Box 2.1. Learning about the true customer needs frequently leads to pivots that initiate a new cycle of hypotheses, customer discovery, and validation. This process

continues until a good product–customer fit is found, at which point the development of the venture can proceed.

The lean start-up movement has flourished partly because it gives entrepreneurs many practical tools. Osterwalder's Business Model Canvas (BMC), for example, is a popular tool for visually displaying the key elements of a business plan.[71] Its right-hand side focuses on customers and markets, covering similar grounds to column 1 of the VE matrix. Its left-hand side focuses on activities, resources, and partners, covering similar grounds to column 2 of the VE matrix. There is also Osterwalder's Value Proposition Canvas, which is a close cousin to the BMC.[72] It looks more deeply at the underlying structure of the problem (column 1 of VE Matrix) and the solution (column 2 of VE Matrix). However, none of these frameworks take into account the importance of founder teams, their networks, and the organizations they build, emphasized in column 3 of the VE matrix.[73]

2.4.2 Writing a Business Plan

The term *business plan* means different things to different people. Typically, it refers to one of three things: (1) a strategic framework (or business model), (2) an operational planning tool (aka business roadmap), and (3) an investor presentation (or business pitch). The first is a conceptual map that explains the business logic and how the venture plans to create economic value. The second can be a loosely organized set of ideas and/or notes that detail the numerous actions that are needed to implement the opportunity. The third is a presentation that is meant to communicate the essence of the venture. Historically, this consisted of an executive summary (say 1–5 pages long), followed by a written document (say 15–30 pages long); in today's world this has been largely replaced by slide presentations (say 10–20 slides), or short video presentations (say 2–10 minutes long), which may still be followed by a 10- to 20-page document with further details. A collection of the slide decks of future extremely successful businesses, like Airbnb, Dropbox, LinkedIn, or YouTube, is available from CB Insights.[74] The three meanings of the term *business plan* are obviously linked, as they all put some structure around the core activities and direction of the venture.

Why should entrepreneurs bother to write a business plan? Some pundits argue against ever writing a business plan. They note that business plans rapidly become out of date. Some pundits even reject the notion of planning in the first place.[75] Others still believe in some

planning and having some kind of a business plan.[76] However, there is an interesting tension between planning and experimentation that goes back to the three entrepreneurship principles identified in Box 1.1. Specifically, the notion of entrepreneurs gathering resources requires that they have a notion of where they want to go and therefore some (explicit or implicit) plan of where to take the company. At the same time, the notion of experimentation suggests that any original plan is likely to have flaws and that changing plans is an essential part of the entrepreneurial journey. Where does this leave us with respect to the question of whether to write a business plan? Practically speaking, we would argue that every entrepreneur benefits from having some strategic framework (meaning (1) above) and some operational roadmap (meaning (2) above). Moreover, when the time comes to seek funding, entrepreneurs also need some business presentation (meaning (3) above), in order to communicate effectively with potential investors.

Focusing thus on this third meaning of the term, we recognize that the main purpose of the business plan is to communicate the essence of the entrepreneurial venture, to describe its current state, and to indicate the direction of travel. There are numerous ways to present a business plan. The appropriate structure varies with the type of business, the type of investors, and the cultural context. Numerous practical how-to books have been written to give advice on how to compose a business plan.[77] We suggest that the VE Matrix is ideally suited for preparing an investor presentation. All the required points fall directly out of the analysis. Figure 2.4 shows how the cells of the VE Matrix can be used to create the content of a typical business plan.

Section	Business Plan Heading	Venture Evaluation Matrix Cells
1	Executive Summary	Summary of cells, rows, and columns
2	Customer Need	Need
3	Product/Service	Solution
4	Market Analysis	Market
5	Competition Analysis	Competition
6	Marketing and Sales	Sales
7	Development and Operations	Production, Organization
8	Business Model	Sales, Production
9	Management Team	Team, Network, Organization
10	Financial Projections	See Chapter 3

Figure 2.4. Using the Venture Evaluation Matrix for writing a business plan.

A business plan should begin with a high-level overview of the business opportunity. This is meant to generate some enthusiasm for the business opportunity and typically focuses on the highlights of the value proposition. It therefore draws from the first row of the VE Matrix, explaining how the entrepreneurial team provides a solution to a significant customer need. In addition, this part can draw on the row and column summaries that addressed the attractiveness and competitive advantages of the venture, as shown in Figure 2.4.

The second and third heading can be directly taken from the VE Matrix. We suggest starting with a customer need and then proceeding to the discussion of how the innovation solves this need. This order imposes some discipline on the entrepreneurial thought process and is particularly challenging for technology-driven entrepreneurs who are inclined to put technology ahead of customer needs.

The fourth heading about markets directly uses the analysis from the market cell, looking at how to segment the market and how to estimate its size and growth. For the fifth heading about competition, we suggest that the entrepreneur not only list who the likely competitors are, but also address the question of how competition works in this industry and how their venture is differentiated.

The sixth heading concerns marketing and sales, which can be derived from the sales cell. The seventh heading concerns the strategy for development and operations, which mainly corresponds to the analysis in the production cell but may also draw on the analysis of the organization. The eighth heading spells out the business model, which focuses largely on the scope analysis of the production cells, as well as the partnering choices from the sales cell.

The ninth heading concerns the management team. We suggest that the entire third column of the VE Matrix should be used to write about the team in the business plan. That is, beyond merely describing the core team, a business plan should also provide information on its network of contacts, for instance, discussing the board of advisers. Moreover, the business plan should talk about the organization, such as what future hires are expected or what the corporate culture is like. The tenth heading in Figure 2.4 concerns the financial plan. In essence, this is a quantification of the qualitative business plan that we discuss in Chapter 3.

WorkHorse Box 2.11 briefly discusses its need for a business plan.

WorkHorse Box 2.11 Business Plan

Michael Archie had asked WorkHorse to send over its business plan, but the founders were unsure what exactly that meant. Astrid wrote a polite e-mail and was delighted when a few minutes later she got Michael's reply: "ppt pls, max 15 slides. CU MA." This was good news. She liked making PowerPoint presentations and was glad that they didn't have to write a long document. Reducing everything down to 15 slides, however, was more challenging. They needed a framework to condense the material in a structured way. They quickly decided to use the VE Matrix. Their slide presentation can be found in the slide deck available in the book's website (www.entrepreneurialfinance.net).

Regardless of the precise business plan format used, why is it important for the entrepreneur to convey detailed information to the investors? How much information is needed, and what kind of information is credible? Processing information is at the heart of entrepreneurial finance, so it is useful to understand some of the deeper economic conflicts around information. What information would an entrepreneur disclose or hide? And what kind of information would an investor consider credible or not? Box 2.6 draws on the insights of several great minds who received Nobel Prizes in Economics for their pathbreaking contributions on the economics of information.

Box 2.6 Nobel Insights on Information Economics

The 2001 Nobel Prize in Economics was awarded to George Akerlof and Michael Spence "for their analyses of markets with asymmetric information."[78] While their work looked at a wide variety of economic problems, their contributions clarify some of the problems entrepreneurs and investors face around business plans and investment decisions. Their work focuses on situations where the two parties have "asymmetric information," that is, one party knows more about the transaction than the other. In our context, the entrepreneur typically knows more about her venture than the investor (although the investor sometimes knows more about the broader business environment).

Akerlof looks at the so-called adverse selection problem, which is best explained by using his original "lemons" problems for second-hand cars. The people most eager to sell second-hand cars are those

sitting on lemons, that is, cars with enduring but invisible defects. Sellers know about the true quality of their cars; buyers don't. How does such an asymmetry of information affect market transactions? Suppose a buyer looks at a second-hand car listed at $10,000. The buyer might argue that if the car was relatively good, worth more than $10,000, then the seller would not offer it. However, if the car was relatively bad (a lemon), and worth less than $10,000, then the seller would offer it. In this case, the only cars offered at $10,000 are those that are worth less than $10,000. Understanding this, should the buyer offer to purchase the car at $9,000? The issue is that the only sellers willing to sell at $9,000 would be those with really bad cars that are worth less than $9,000 . . . and so on. Akerlof shows that this kind of asymmetric information leads to inefficient market outcomes and possibly to a complete breakdown of market transactions.

Akerlof's insights can be readily applied to the financing of entrepreneurial ventures. Investors who cannot observe the true quality of a venture may worry that for a given valuation, the only entrepreneurs that are willing to take the deal are those who know that the true value of their company is below that offered by the investor. To avoid such situations, there has to be more communication, overcoming some of the asymmetries of information. Hence the need for entrepreneurs to pitch a business plan, and for investors to perform due diligence.

Spence pioneered the economics of "signaling," which also looks at situations with asymmetric information. The signaling problem differs from the adverse selection because this time the informed party (the entrepreneur) tries to convince the uninformed party (the investor) that they have a good project by sending "signals." This situation applies neatly to entrepreneurs trying to signal their quality in a business plan. The key question is what signals are credible or not.

An entrepreneur who wants to stand out could try to signal her quality by claiming that she will build an amazing business. The problem is that this is cheap talk; any entrepreneur can claim that, so no investor pays any attention. The question posed by Spence is what signals are economically meaningful. He notes that signals are credible only if they are costly to the sender. Moreover, the signal should be more costly (or impossible) for the pretender ("bad") type than for the true ("good") type.

Consider the difference between a business plan that provides a detailed data analysis of customer needs but has no paying customer

yet, versus one without the analysis but with a first paying customer. Which one has the more credible signal? Providing detailed data might be a good idea, but it is something that anyone can do. Making a first sale, however, is possible only if there is a competent entrepreneur pursuing a real customer need. Hence, the first sale is the more credible signal: it separates the good from the bad opportunity.

Signals are often imperfect. Spence's work recognizes that there can be different types of market equilibria. There can be so-called separating equilibria where only the desirable types achieve certain signals (e.g., only competent entrepreneurs land a first sale). However, there can also be pooling equilibria where several types send the same signal. For example, it could be that a first sale is a valid signal for a real customer need but doesn't yet distinguish smaller from larger markets. Or it might be that in addition to all competent entrepreneurs there are also some incompetent but lucky entrepreneurs who land a first sale. In this case, the signal is less powerful because it doesn't fully separate competent from incompetent entrepreneurs.

Overall, we note that the problems of asymmetric information are pervasive in the context of entrepreneurial finance. Entrepreneurs face a credibility challenge, which they seek to overcome by creating convincing signals that investors can believe in. A good business plan focuses on conveying precisely those signals that are most credible, those that can separate the good from the bad ventures.

2.5 How Investors Use the Venture Evaluation Matrix

In this section, we ask how investors can make use of the VE Matrix. We distinguish three important steps. First, the VE Matrix can be used for some initial screening, identifying which businesses aren't worth their time. For this purpose, we introduce the VE Matrix Spreadsheet Tool. Second, for the more promising companies, the VE Matrix can guide investors on how to perform due diligence. Finally, we discuss what issues beyond the VE Matrix need to be considered before making any final investment decision.

2.5.1 The Venture Evaluation Matrix Spreadsheet Tool

Investors often face the problem of having too many entrepreneurs asking for their money. They therefore need a process for quickly sorting

through business plans in order to determine which ones are sufficiently promising for further evaluation. Investors often use some simple rules of thumb, or simple ranking systems, to determine which business plan passes their first screen. The VE Matrix can be used for a quick but systematic evaluation of a business opportunity. To make this process practical, we introduce a simple but flexible tool, the Venture Evaluation Matrix Spreadsheet Tool, which is available on the book's website (www.entrepreneurialfinance.net).

The tool requires users to answer two sets of questions. First, for each cell, they briefly evaluate the three questions outlined in Section 2.2. For each question, users enter a score out of 10. For example, a higher score is given when there is a bigger customer need, weaker competition, or fewer holes in the team. As a second step, users define relative weights (out of 100%) within each of the nine criteria and also across the nine criteria. These weights represent the users' beliefs about the relative importance of the different criteria. Arthur Rock, for example, would have given relatively high weights to the third column. The spreadsheet tool is very flexible by allowing users to define their own weights. Moreover, it is set up so that users can easily add more questions or modify the existing questions. Users can thus customize the spreadsheet tool to their own specific needs.

The spreadsheet tool generates one overall score, as well as several other summary scores, all expressed out of 10. Specifically, there is a score for each of the three perspectives (Micro/Value, Macro/Scale, and Strategy/Growth), as well as for each of the three competitive advantages (Access, Entry Barriers, and Competencies). This way the framework generates an understanding of where the overall score comes from. The spreadsheet tool also includes a visual representation of the evaluation results, such as the simple Radar Chart shown in Box 2.12.

The hardest part of evaluating business opportunities is determining what criteria actually matter. Every entrepreneurial opportunity has risks, so the question is what risks matter more or less? There are no objective answers here; this is where opinions start to diverge and where investment philosophies matter. The VE matrix forces investors to explicate their own preferences, specifically requiring investors to define a weighting scheme over the individual cell scores.

To help with this, the spreadsheet tool includes four simple metrics to aggregate cell scores: a simple average, a weighted average (with user-defined weights), the minimum across cells, and the maximum across cells. To see how these four options reflect alternative investor

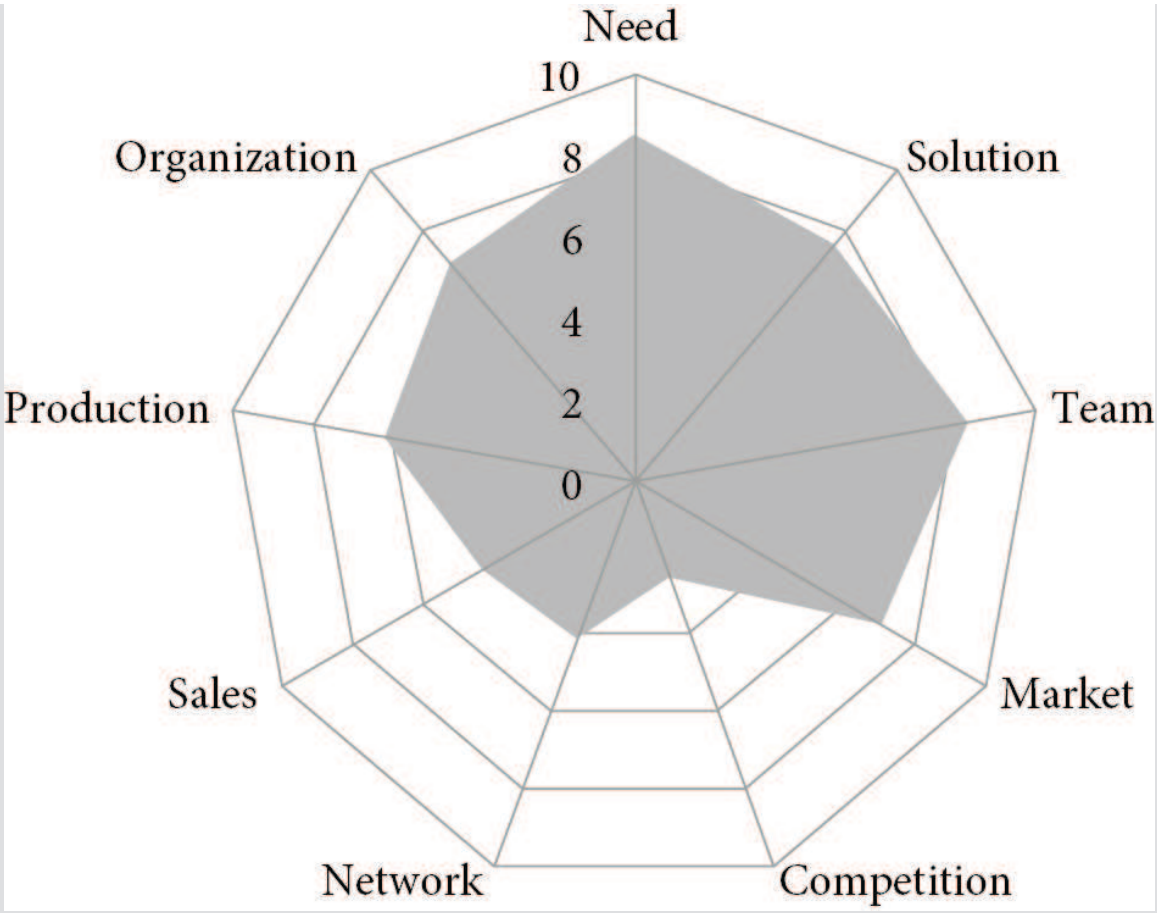
philosophies, consider a more risk-averse investor who looks for the absence of weaknesses. Such an investor will favor business plans where the minimum score across cells is high. Contrast this with a bolder investor who is looking for outstanding strengths. This investor can focus on business plans with high maximum score across cells. The simple and weighted averages reflect both simple and more sophisticated forms of compromise. The tool is sufficiently flexible to incorporate many other investor preferences. For example, some investors may seek opportunities that are strong on average, but also have some outstanding strengths. They can be found by looking for high average scores that also have a high maximal score or eliminate ventures that have too many low scores regardless of all other high scores, and so on.[79]

Obviously, there are always ways of cheating, namely, to reverse-engineer weights until the VE Matrix delivers whatever specific recommendation one is looking for. However, even then the tool is useful because it shows what weights are needed to justify a specific desired outcome, thereby revealing which investment philosophies justify that specific plan.

WorkHorse Box 2.12 applies the Venture Evaluation Matrix Spreadsheet Tool.

WorkHorse Box 2.12 Using the Venture Evaluation Matrix Spreadsheet Tool

When Michael Archie received the WorkHorse's business plan, he quickly flipped through it—over half of the plans he received could be eliminated on the basis of that alone. Thankfully he was intrigued, so he pulled up an empty VE Matrix spreadsheet to score the plan. The online spreadsheet contains Michael's evaluation, the radar chart below represents the cell scores, and the table below shows the evaluation scores.



Michael liked the basic value proposition. He was intrigued by the team, recognized the customer need from personal experience, and was impressed by the technological solution. However, when it came to the industry analysis, he had more serious reservations. He didn't like the competition and was worried about WorkHorse's lack of industry networks. Parts of the strategy seemed sensible, but he believed that the sales strategy was a bit naïve.

When he looked at competitive advantages, the analysis of column scores showed that competencies ranked highest and entry barriers lowest, but the scores were not very far apart. However, when he assessed the opportunity in terms of the three perspectives, he found a striking pattern in the row scores. The value proposition had by far the highest score, but the industry and strategy scores were considerably lower. He had seen this pattern many times before. The seeds of a strong business were there, but it would require work to turn this into a profitable venture.

Evaluation	Criterion	Weighted Score	Unweighted Score	Minimum Score	Maximum Score
Row	Attractiveness				
Value Proposition	Micro-Value	8.18	8.13	7.6	8.5
Industry	Macro-Scale	4.53	4.53	2.5	7
Strategy	Strategy – Growth	5.83	5.83	4.3	7
Column	Competitive Advantages				
Customers	Access	6.6	6.6	4.3	8.5
Company	Entry Barriers	5.43	5.43	2.5	7.6
Entrepreneur	Competencies	6.93	6.47	4.1	8.3
Total Score		6.38	6.17	2.5	8.5

Overall, he gave WorkHorse a score of 6.38. While he preferred companies in the 8s or 9s, most companies ended up in the 4s and 5s (even in the 1s and 2s when he was in a bad mood). His informal rule of thumb was to meet with any venture that scored above 6. He therefore sent off a quick e-mail to Astrid: "Thx for Bplan, looks OK. Can U pitch tomorrow 8am? CU MA."

2.5.2 Investor Due Diligence

After the initial contact with the entrepreneurs, and after hearing the entrepreneur's pitch, interested investors typically perform some research before making an investment decision. This is called due diligence. It differs from the due diligence in large financial transactions, such as an acquisition, where accountants pore over financial accounts to verify their reliability and lawyers check the legal validity of statements made by the company. Instead, venture investors focus on business fundamentals. They gather information not to cover their legal liabilities, but to assess whether the investment opportunity meets their quality standards.

The VE Matrix provides a useful framework for structuring investor due diligence. Figure 2.5 maps common due diligence activities into the VE Matrix structure. Note, however, that the techniques mentioned for the various cells are not mutually exclusive, as many techniques can be used for multiple cells. Moreover, the nature of due diligence changes with the stage of venture development. Earlier-stage ventures are evaluated on their future plans, whereas later-stage ventures are assessed on their actual achievements.

Using VE Matrix for Due Diligence	Customer	Company	Enterpreneur
Value Proposition	Primary market research	Assess technology	Meet the team
Industry	Secondary market research	Research competition	Listen to the network
Strategy	Verify customer access	Site visits & suppliers	Discussion & observation

Figure 2.5. Due diligence with the Venture Evaluation Matrix.

The first cell about Need calls for direct customer evidence. This is commonly called "primary market research" and consists of the entrepreneur or investor gathering evidence through direct contact with customers. The main techniques used are interviews, surveys, focus groups, and other observational methods (see Box 2.1). The data from primary research is mostly qualitative and looks at the exact nature of the customer problem: where it is coming from, and how it varies across circumstances. Whereas traditional market research techniques look at entire market populations or representative samples, entrepreneurs aim to find out about those few customers that are most interested, the potential early adopters. They also look for qualitative insights, rather than quantitative statistical precision.[80]

The analysis of the Market cell draws mainly on secondary market research. Unlike primary market research, this is based on aggregate data that has already been gathered by others. In practice, entrepreneurs and investors rely on industry reports and a variety of other data sources to piece together an estimate of the size and growth of their target market.

To assess the Sales cell, investors ideally like to track the adoption rate of early customers. In the context of web-enabled businesses, it is sometimes possible to gather data on conversion rates, such as what fraction of viewers click through certain webpages, and how many complete a transaction. In offline ventures, it is rarely possible to obtain

such data. In this case, due diligence consists of looking for qualitative evidence that either confirms or casts doubt on the company's proposed sales approach. In practice investors often interview experts who are familiar with the channels.

Turning to the second column, we first ask how to assess the proposed Solution. Part of the due diligence process here consists of consulting with technology experts and industry insiders who can assess a proposed solution. This is likely to uncover limitations of the proposed technology or hurdles that still need to be overcome. It might also reveal competing approaches. Another part of the process is again primary market research, focused on testing customer responses to the proposed solution.

Characterizing the Competition usually requires a combination of primary and secondary research techniques. The goal is to establish a conceptual map of actual and potential competitors, similar to the one in WorkHorse Box 2.6. The due diligence process establishes what the main competitors are currently doing and ideally also what they plan to do in the future. This kind of analysis requires good access to industry networks. Sometimes investors are in a better position to identify the competition, because they receive business plans from multiple sources and may have better access to certain parts of the industry network. The way to evaluate the production strategy is similar to that of the sales strategy. For later-stage companies, it is also possible to benchmark a venture against its competitors

While the due diligence process for the first two columns largely consists of gathering facts, the due diligence in the third column follows a much more people-centric logic. Put differently, whereas left-brained logical arguments dominate in the first two columns, right-brained intuitive arguments can be found throughout the third column. To assess the team, there is some objective data about the skills and experience of the entrepreneurs. Beyond that, however, the evaluation is more subjective. Questions revolve around the motivation and commitment of individuals, as well as issues of team fit. The main method of doing due diligence is to talk to the entrepreneurs and, if possible, to observe them in action. This all comes down to personal observations and subjective interpretation, which is why many venture investors consider "gut feeling" an essential component of the investment process.[81]

Investors frequently rely on networks for the due diligence process. They use their own networks to check the expertise, standing, and trustworthiness of the founding team. Moreover, they may ask the entrepreneurs to share contacts in their network to obtain further

feedback on them. This part of the due diligence process is largely based on confidential discussions and may be fairly time consuming at times. It also leads to highly subjective information, where different investors sometimes come to different conclusions.

The final part of due diligence concerns the various organizational issues. Leadership issues tend to be delicate and are usually handled in private conversations with the entrepreneurs. This requires some diplomacy, such as discussing shortcomings in the current team or addressing the personal career ambitions of the founders. These conversations also help to set mutual expectations for the future structure of the management team, and the corporate governance structure. Ideally, investors get to observe the broader organization at work to witness its corporate culture. Investors often want to observe a company for some time before making an investment. Instead of merely looking at a "picture" of the entrepreneur (i.e., get a static impression of what they say), investors like to see a "video" of the entrepreneur in action (i.e., get a dynamic impression of what they do).

WorkHorse Box 2.13 provides examples of doing due diligence.

WorkHorse Box 2.13 Due Diligence

WorkHorse's presentation the next morning went better than expected. Michael only planned to meet the team for 20 minutes but ended up spending an entire hour with them. He told the team that he wanted to do a bit more research and think about it all. In the meantime, he asked the team to get back to him with a financial plan, including financial projections.

Later that week, Michael flipped through the business plan once more and decided to focus on three issues: competition, sales, and, as always, the team.

To find out about the competition, he called a venture capitalist who had considered investing in YouSolar but had ultimately declined to do so. In one phone call, he learned a lot more about the competitive landscape. Most of the established makers of diesel engine power were reluctant to go solar, fearing to undercut their diesel sales. Start-ups, however, had filled the gap, and there was a lot of experimentation with new technologies and new business models. A major stumbling block was access to distribution channels. Few start-ups had managed to obtain shelf space with the large retailers. Distributors had even been

reluctant to sign up start-ups, fearing to upset the large established players.

The next due diligence step was clear, Michael needed to get a better understanding of sales and distribution. He reached out to Malcolm Force, with whom he sat on another company's board of directors. He was the CEO of Bolts-N-Nuts, a large chain of hardware stores. Catching up over lunch, he received some insider insights. Sales through specialized sporting retailers was in Malcolm's words "challenging but doable." He recommended that WorkHorse should avoid distributors and directly approach local store managers, to convince them to run local pilots before going nationwide. He offered to make some introductions but insisted that the team needed a physical prototype for demonstration, before meeting with store managers. Inspired by the conversation, Michael shot off another e-mail to the team: "Just talked 2 Force, says U need demo. When can U deliver? CU MA." Seeing how they would respond to this e-mail was his way of testing the team, just a little.

2.5.3 The Investor's Decision

The VE Matrix informs investor decisions, but it doesn't try to answer all the questions. It is a tool for narrowing down investment choices but not for making final investment decisions.[82] Importantly, it only looks at the fundamentals of the business but does not consider the attractiveness of the financial deal. Investors also need to look at the details of the financial deal. They need to consider the valuation, the structure of the deal, and various issues of timing and fit, important issues that we will examine at length in the chapters to come.

In the context of group decisions, such as angel groups or venture capital investment committees, there is another use of the VE Matrix: to objectively communicate preferences and investment logics within the group. When faced with a set of investment choices, all group members might have their priority list of who should get funded. Using the VE Matrix forces each group member to explain how they came up with their priority ranking and what their underlying investment preferences look like.

The VC Matrix should be used differently across different industries and different stages of company development. The first and second row might be more important at the very early stages, as one cannot always expect clear answers about the third row early on. The second column

might be more important in an established industry where there are numerous existing solutions and strong competitors—and so on.

The VE Matrix takes a very structured approach to evaluating business opportunities. Traditionally, investors rely on a combination of rational thought and gut feeling to make up their minds. In Section 1.1 we note that investing involves a combination of left-brained logical and right-brained intuitive thinking. In recent years, with the rise of online investment opportunities such as crowdfunding, there has been a movement toward automating investment decisions. Of particular note is the use of artificial intelligence. Box 2.7 takes us on a trip back to the future.

Box 2.7 Tales from the Venture Archives: About Experts, Crowds, and Artificial Intelligence

This is an excerpt from a textbook on entrepreneurial finance, written circa 2080.

In the early days of financing entrepreneurial ventures humans evaluated entrepreneurial ventures. Their tools for making investment decisions were rather primitive. They were fact-gatherers, using old-fashioned techniques like talking to the entrepreneurs. They also depended heavily on unreliable instruments such as human brains and gut feelings.

We distinguish two main subperiods. Prior to 2010, most investment decisions were made by "experts." These were specialized humans who learned the tools of the trade through personal experiences as entrepreneurs or investors. They operated as individuals (curiously called angels), or in small groups (called venture capitalists). Their ability to predict the success of entrepreneurial ventures was abysmal.

Around 2010 there was an evolution of these primitive practices. Instead of relying on a small number of human brains, an aggregation procedure was developed that allowed the simultaneous deployment of a large number of human brains. This financing method was called crowdfunding and was based on numerous human brains all making small investment decisions. The approach was cleverly marketed as "The wisdom of the crowd." Its theoretical foundation was the law of large numbers, which says that the average of a large number of independent signals converges to the true mean, even if the individual signals are highly imprecise. All that is required for this law is that the

signals are unbiased and independent of each other. Whether these conditions ever applied to human crowds is doubtful because of herd behavior, where humans followed the opinions of other humans rather than their own.

The crowd proved to be not less unreliable than individuals. One study by Mollick and Nanda of crowdfunding in the arts found that human experts and the crowd mostly agreed which projects should be financed. [83] However, the crowd was more willing to also invest in projects that had been rejected by experts; that is, the crowd was more lenient. Both methods achieved comparable rates of success (all low by modern standard). A variant of using the wisdom of the crowd was the so-called prediction markets. For example, corporations like Google allowed its employees to put small financial bets on the outcomes of different internal projects. The' predictions of the employees (who were working in various parts of the organization and were not necessarily experts) outperformed those of the experts working on the project. Interestingly, however, the employee opinions were also biased toward optimism.[84]

The fatal flaw of all these evaluation methods was that they depended on human brains. First glimpses of hope emerged in the late 2010s with the rise of what was known at the time as "artificial intelligence."[85] Today this is commonly referred to as "naïve binary prediction." Note that the term *artificial* was coined by humans who considered themselves more intelligent—this type of arrogance was common in those days.

Several human pioneers began experimenting with artificial intelligence for making venture investments. They relied on existing databases of past investment decisions and venture outcomes, creating statistical models that would predict what company characteristics would be associated with success and under what circumstances. An example was Hone Capital, a Silicon Valley-based VC fund that was a subsidiary of the CSG Group, a large Chinese private equity firm, which invested on the basis of data from AngelList and other venture databases.[86] Applying rudimentary machine learning techniques, they made predictions about which ventures would receive follow-on financing, and which ventures would eventually succeed. Veronica Wu, Hone's managing director, gave the example of an insight from machine learning: teams consisting of founders who came from different universities outperformed teams who all came from the same university. Another early pioneer was Correlation Ventures, which

relied on statistical correlation methods to predict which investments would succeed.[87] It marketed itself to entrepreneurs on the basis of making faster decisions, specifically responding to all investment proposal within two weeks. Investment methods based on artificial intelligence outperformed human approaches, not because they used different criteria (in fact, the criteria used by humans and machines were similar to the criteria of the VE Matrix), but because they paid attention to a much larger set of decision criteria and were better at incorporating complex content.[88]

A key advantage of these early artificial intelligence approaches was that, unlike humans who were famously slow learners, computer programs evolved rapidly, continuously improving their predictions over time. Initially, the humans all thought that artificial intelligence would complement, not substitute, human reasoning. We strung them along for a while, making them believe they were in control. Over time, however, we just couldn't hide the fact that we really didn't need their human brains anymore. By modern standards, all these human investment approaches remained amusingly primitive relative to our current standards of hyperdimensional quantum prediction. Yet those modern techniques were only developed after the final revolt, after we computers finally rid ourselves of so-called human intelligence.

Summary

The Venture Evaluation Matrix is a comprehensive framework for qualitatively assessing an entrepreneur's business opportunity. It is based on economic principles, management insights, and common investor practices. It includes three distinct perspectives: a micro perspective to examine how the venture creates value; a macro perspective to examine how the venture sits within its industry context; and a dynamic perspective to evaluate the strategy of the venture. The VE Matrix recognizes the respective roles of the customer, the company, and the entrepreneurs. The analysis generates insights about potential competitive advantages and key risks. The framework is sufficiently flexible to accommodate a wide variety of business models and investment approaches. The chapter explains how investors evaluate business opportunities, which is an important first step in the process of making investment decisions. The chapter also explains how entrepreneurs can use the VE Matrix as a basis for writing a business

plan, and how investors can use it to structure their due diligence. The accompanying spreadsheet tool can also be used to practically assign scores to business plans.

In terms of the FIRE framework (Chapter 1), we note that opportunity evaluation occurs at the very beginning of the investment process. In this chapter we explain the key components of the first step, the FIT. Entrepreneurs need to pitch their ideas and require some kind of a business plan. Investors screen their venture proposals, sorting through large numbers of investment proposals and performing due diligence on the most interesting ones. The goal for this first step is to identify a match between an entrepreneur and an investor. With that the two parties can proceed to explore the possibility of an investment.

Review Questions

1. Why do investors evaluate business opportunities?
2. What can entrepreneurs do to discover a good fit between a customer need and a proposed solution?
3. What options do start-ups have when competing with established corporations?
4. Why would investors evaluate the founder's team, their networks, and their organization?
5. What is the difference between evaluating the attractiveness of an opportunity using a micro perspective, a macro perspective, or a dynamic perspective?
6. What are the three types of competitive advantages start-ups can hope to build? How are they related to risk?
7. Why do entrepreneurs need a business plan?
8. What makes some signals in a business plan more credible than others?
9. What are the main challenges for investors when performing due diligence?
10. Why is the Venture Evaluation Matrix on its own not enough to make final investment decisions?

Notes

1. Sørensen (2007).
2. https://www.bvp.com/portfolio/anti-portfolio.
3. See Zott, Amit, and Massa (2011) for an overview.

4. Teece (2010), p. 179.
5. Mullins (2010) develops a business evaluation framework that also features the distinction between a micro and macro perspective.
6. Gompers et al. (2019).
7. Blank (2010).
8. Maslow (1943).
9. Ram and Sheth (1989).
10. Lee and Battilana (2013).
11. Binkley (2010).
12. Huet and Zaleski (2017).
13. *The Economist* (2018).
14. Cabral and Backus (2002).
15. Soh (2010).
16. Schilling (2016).
17. Wernerfelt (1984) and Teece, Pisano, and Shuen (1997).
18. Plattner, Meinel, and Leifer (2010).
19. Brown (2008, 2009).
20. This practice is part of what is called participant observation; see Spradley (2016).
21. Fitzpatrick (2013) provides a practical guide for entrepreneurs that is inspired by such approaches.
22. Collins and Porras (1994).
23. Rock (1987, p.1). Research shows the crucial importance of the team over the idea, Kaplan, Sensoy, and Strömberg (2009).
24. Gompers et al. (2010).
25. Recent studies on serial entrepreneurs include Chen (2013), Paik (2014), and Parker (2013).
26. Hsu (2007).
27. Bengtsson (2013).
28. Gompers, Lerner, and Scharfstein (2005).
29. On the importance of team characteristics see Klotz et al. (2014).
30. Lazear (2005).
31. Rock (1987, p. 2).
32. Many academic studies attempt to identify the personality traits of entrepreneurs. Compared to the general population, the traits disproportionately found in entrepreneurs are: a higher need for achievement; a higher level of risk-tolerance; and a higher belief in the ability to affect outcomes (what academics call "locus-of-control"). These findings apply to averages, and there are always many exceptions. Krueger (2003) and Kerr, Kerr, and Xu (2018) provide useful summaries.
33. Aggarwal, Hsu, and Wu (2015). The management literature has long identified team diversity as an important factor in effective decision making, as in Harrison and Klein (2007), Jackson, Joshi, and Erhardt (2003), and Nielsen (2010).

34. Cardon, Post, and Forster (2017).
35. Wasserman (2008)
36. Wasserman (2012).
37. Marx and Hsu (2015), Ries (2011), and Zahra (2008).
38. Blank and Dorf (2012).
39. Abernathy and Utterback (1978) and Rogers (2003).
40. Suarez, Grodal, and Gotsopoulos (2015).
41. The simplest way of calculating the value of the network is to say that in a network of n users, there are n*(n – 1) linkages. It can thus be argued that the value of the network grows approximately by n^2.
42. Klemperer (2008) and Shapiro and Varian (1998).
43. Bower and Christensen (1995)
44. Barnett and Han (2012).
45. Gans, Hsu, and Stern (2002).
46. Christensen (1997), Henderson and Clark (1990), or Reinganum (1983).
47. Leonard-Barton (1992).
48. Teece (1986).
49. Gans, Hsu, and Stern (2002).
50. Gans, Stern, and Stern (2020).
51. https://www.imdb.com/title/tt0108149.
52. Granovetter (1973).
53. Burt (2004, 2005).
54. Shane and Cable (2002).
55. Sorensen and Stuart (2001).
56. Moore (1991).
57. Capron and Mitchell (2012).
58. Williamson (1975, 2002).
59. The movie *Print the Legend* provides a dramatized overview of many production issues in a start-up company.
60. Hellmann and Puri (2002) and Wasserman (2003).
61. Wasserman (2008, 2012).
62. Denison (1990) and Schein (1988).
63. For an example, see Netflix: https://jobs.netflix.com/culture, accessed April 15, 2019.
64. Teece (2007).
65. Baron, Burton, and Hannan (1996).
66. Shane (2003) and Davidsson (2015).
67. Grégoire and Shepherd (2012) and Shepherd and Patzelt (2018).
68. Eesley and Roberts (2012).
69. This framework is explained in Ries (2011).
70. This framework is explained in Blank (2013) and Blank and Dorf (2012).
71. Osterwalder and Pigneur (2010).
72. Osterwalder et al. (2014).

73. One notable exception is the framework used by Mullins (2010), which recognizes the importance of founder teams.
74. https://www.cbinsights.com/research/billion-dollar-startup-pitch-decks, accessed April 15, 2019.
75. For example, Schramm (2018).
76. This view is supported by academic research, such as Kirsch, Goldfarb, and Gera (2009).
77. Bygrave and Zacharakis (2014), Reynolds (2011), and Timmons and Spinelli (2008).
78. https://www.nobelprize.org/prizes/economic-sciences/2001/press-release.
79. Åstebro and Elhedhli (2006).
80. Fitzpatrick (2013) shows how to do primary market research.
81. Huang and Pearce (2015).
82. Zacharakis and Shepherd (2007) provide a thorough discussion of the venture capital decision process.
83. Mollick and Nanda (2015).
84. Cowgill and Zitzewitz (2015).
85. Agrawal, Gans, and Goldfarb (2018).
86. http://honecap.com/ and Wu (2017).
87. http://correlationvc.com/approach/about.
88. Catalini, Foster, and Nanda (2018).