Technology Ventures
From Idea to Enterprise

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DEDICATION

For our spouses: Michele Mandell, Joy Dorf, and Ann Carney Nelson. We warmly recognize their love and commitment to this publication that will help others create important enterprises for the benefit of all.

THOMAS H. BYERS, RICHARD C. DORF, ANDREW J. NELSON

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PART IV FINANCING AND BUILDING THE VENTURE

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FOREWORD

by John L. Hennessy, President of Stanford University

I am delighted to introduce this book on technology entrepreneurship by Byers, Dorf, and Nelson. Technology and similar high-growth enterprises are both an important part of our world's economic growth story as well as the place where many young entrepreneurs realize their dreams.

Unfortunately, there have been relatively few complete and analytical books on technology entrepreneurship. Byers, Dorf, and Nelson bring their years of experience in teaching to this book, and it shows. Their personal experiences as entrepreneurs are also clear throughout the book. Their connections and involvement with start-ups—ranging from established companies like Google and Genentech to new ventures just delivering their first products—add a tremendous amount of real-world insight and relevance.

One of the most impressive aspects of this book is its broad coverage of the challenges involved in technology entrepreneurship. Part I talks about the core issues involved when deciding to pursue an entrepreneurial vision and what characteristics are vital to success from the very beginning. I am pleased to see that key topics include building and maintaining a competitive advantage and market timing. During the Internet boom of 2000, several great new companies were built, but too many entrepreneurs and investors forgot several key principles: have a sustainable advantage, create a significant barrier to entry, and be a leader when the market and the technology are both ready. Hopefully, the material in these chapters will help prevent future irrational behavior by both entrepreneurs and investors.

Part II examines the major strategic decisions with which any group of entrepreneurs must grapple: how to balance risk and return, what entrepreneurial structure to pursue, how to find and cultivate the best employees and help make them productive, and the critical issue of intellectual property. Indeed, these are problems faced by every company, and ones that must be continuously examined by the leadership in any organization.

Part III discusses the operational and organizational challenges that all entrepreneurs must tackle. Virtually every start-up led by a technologist that I have been close to inevitably wonders whether it needs sales and marketing. Sometimes in such companies, you hear a remark like: "We have great technology and that will bring us customers; nothing else matters!" I remind them that without sales, there is no revenue, and without marketing, sales will be diminished. It is important to understand how to approach these vital aspects of any successful business. The related topics of building the organization, thinking about acquisitions, and managing operations are also important. If you fail to address these aspects of your company, it will not matter how good your technology is.

Finally, Part IV talks about putting together a solid financial plan for the company, including exit and funding strategies. Of course, such topics are crucial, and they are often the sole or dominant topics of "how-to" books on entrepreneurship. Certainly, the financing and the choice of investors are key, but unless the challenges discussed in the preceding sections are overcome, it is unlikely that a new venture, even if well financed, will be successful.

In looking through this sage and comprehensive treatment, my overwhelming reaction was, "I wish I had read a book like this before I started my first company (MIPS Technologies in 1984)." Unfortunately, I had to learn many of the topics covered here in real-time and often by making a mistake on the first attempt. In my experience, it is the challenges discussed in the earlier sections that really prove to be the minefields. Yes, it is helpful to know how to negotiate a good deal and to structure the right mix of financing sources, especially so that employees can retain as much equity as possible. If, however, you fail to create a sustainable advantage or lack a solid sales and marketing plan, the employees' equity will not be worth much.

Those of us who work at Stanford and live near Silicon Valley are in the heart of the land of technology entrepreneurship. With this book, many others will get to share the extensive and deep insights of Byers, Dorf, and Nelson on this wonderful process that builds tomorrow's enterprises and business leaders.

PREFACE

Entrepreneurship is a vital source of change in all facets of society, empowering individuals to seek opportunities where others see insurmountable problems. For the past century, entrepreneurs have created many great enterprises that subsequently led to job creation, improved productivity, increased prosperity, and a higher quality of life. Entrepreneurship is now playing a vital role in finding solutions to the huge challenges facing civilization, including energy, environment, health, security, and education.

Many books have been written to help educate others about entrepreneurship. Our textbook was the first to thoroughly examine a global phenomenon known as "technology entrepreneurship." Technology entrepreneurship is a style of business leadership that involves identifying high-potential, technology-intensive commercial opportunities, gathering resources such as talent and capital, and managing rapid growth and significant risks using principled decision-making skills. Technology ventures exploit breakthrough advancements in science and engineering to develop better products and services for customers. The leaders of technology ventures demonstrate focus, passion, and an unrelenting will to succeed.

Why is technology so important? The technology sector represents a significant portion of the economy of every industrialized nation. In the United States, more than one-third of the gross national product and about half of private-sector spending on capital goods are related to technology. It is clear that national and global economic growth depends on the health and contributions of technology businesses.

Technology has also become ubiquitous in modern society. Note the proliferation of cell phones, personal computers, and the Internet in the past decade and their subsequent integration into everyday commerce and our personal lives. When we refer to "high-technology" ventures, we include information technology enterprises, biotechnology and medical businesses, energy and sustainability companies, and those service firms where technology is critical to their missions. At the beginning of the twenty first century, many technologies show tremendous promise, including photonics and Internet advancements, medical devices and drug discovery, nanotechnology, and materials technologies related to energy and the environment. The intersection of these technologies may indeed enable the most promising opportunities.

The drive to understand technology venturing has frequently been associated with boom times. Certainly, the often-dramatic fluctuations of economic cycles can foster periods of extreme optimism as well as fear with respect to entrepreneurship. However, some of the most important technology companies have been founded during recessions (e.g., Intel, Cisco, and Amgen). This book's principles endure regardless of the state of the economy.

APPROACH

Just as entrepreneurs innovate by recombining existing ideas and concepts, we integrate the most valuable entrepreneurship and technology management theories from the world's leading scholars to create a fresh look at entrepreneurship. We also provide an action-oriented approach to the subject through the use of examples, exercises, and lists. By striking a balance between theory and practice, our readers gain from both perspectives.

Our comprehensive collection of concepts and applications provides the tools necessary for success in starting and growing a technology enterprise. We show the critical differences between scientific ideas and true business opportunities. Readers benefit from the book's integrated set of cases, examples, business plans, and recommended sources for more information.

We illustrate the book's concepts with examples from the early stages of high-technology firms (e.g., Intel, Google, and Genentech) and traditional firms that use technology strategically (e.g., FedEx and Wal-Mart). How did they develop enterprises that have had such positive impact, sustainable performance, and longevity? In fact, the book's major principles are applicable to any growth-oriented, high-potential venture, including high-impact nonprofit enterprises such as Conservation International and the Gates Foundation.

AUDIENCE

This book is designed for students in colleges and universities, as well as others in industry and public service, who seek to learn the essentials of technology and high-growth entrepreneurship. No prerequisite knowledge is necessary, although an understanding of basic accounting principles will prove useful.

Entrepreneurship was traditionally taught only to business majors. Because entrepreneurship education opportunities now span the entire campus, we wrote this book to be approachable by students of all majors and levels, including undergraduate, graduate, and executive education. Our primary focus is on science and engineering majors enrolled in entrepreneurship and innovation courses, but the book is also valuable to business students and others with a particular interest in high-growth ventures.

For example, our courses at Stanford University, the University of Oregon, and the University of California, Davis, based on this textbook regularly attract students from majors as diverse as computer science, product design, political science, economics, pre-med, electrical engineering, history, biology, and business. Although the focus is on technology entrepreneurship, these students find this material applicable to the pursuit of a wide variety of endeavors. Entrepreneurship education is a wonderful way to teach universal leadership skills, which include being comfortable with constant change, contributing to an innovative team, and demonstrating passion in any effort. Anyone can learn entrepreneurial thinking and leadership. We particularly encourage instructors to design courses in which the students form study teams early in the term and learn to work together effectively on group assignments.

WHAT'S NEW

Based upon feedback from readers and new developments in the field of technology entrepreneurship, numerous enhancements appear in this third edition. Recent compelling academic theories and practitioner insights in entrepreneurship are included in the text. Special attention is given to technology transfer and commercialization processes, open source innovation, and social entrepreneurship. All examples and exercises were reviewed to place even more emphasis on exciting technology ventures around the globe involved in energy and environmental technology applications, often referred to as clean or green tech.

Chapters 1 and 2 are now better organized to introduce the the art and science of venturing. Chapter 4 on strategy development now contains important sections regarding alliances and social responsibility. The discussion in Chapter 5 on creativity and sources of innovation has a smoother flow. The concept story and business plan development materials and tools are expanded and summarized in Chapter 7. Chapter 13 now contains a section on clusters and regions of entrepreneurship. New sections on cost drivers and grants as a source of capital were added to Chapters 16 and 18, respectively. Three new full-length cases are included in the appendix including two from the famous Harvard Business School archives. Some reordering of sections within chapters streamlines the remaining content.

FEATURES

The book is organized in a modular format to allow for both systematic learning and random access of the material to suit the needs of any reader seeking to learn how to grow successful technology ventures. Readers focused on business plan development should consider placing a higher priority on Chapters 7, 10, 12, 17, 18, and 19. Regardless of the immediate learning goals, the book is a handy reference and companion tool for future use. We deploy the following wide variety of methods and features to achieve this goal, and we welcome feedback and comments.

Principles and Chapter Previews—A set of 20 fundamental principles is developed and defined throughout the book. They are listed in the inside front cover as well. Each chapter opens with a key question and outlines its content and objectives.

Examples and Exercises—Examples of cutting-edge technologies illustrate concepts in a shaded-box format. Information technology is chosen for many examples because students are familiar with its products and services. Exercises are offered at the end of each chapter to test comprehension of the concepts.

Sequential Exercise and Case—A special exercise called the "venture challenge" guides readers through a chapter-by-chapter formation of a new

TABLE P1 Overview of cases.

Cases in appendix B	Synopsis	Issues
Trexel	A university spin-out struggles to commercialize a novel environmental material	Opportunity identification and evaluation, product development, and innovation strategy
Biodiesel	Three founders consider an opportunity in the energy industry	Opportunity identification and evaluation, business model
Yahoo! 1995	Two founders face a decision on financing that forces them to confront their vision	Vision and business model, sources of capital, business plan
Barbara's Options	A soon-to-be graduate weighs two job offers	Stock options, finance
SolidWorks	A founder hits a snag while raising money for his venture	Team, finance, negotiations
Artemis Images	A promising image management company runs into trouble	Competitive strategy, business model, team, finance
Sirtris Pharmaceuticals	A life sciences firm faces major decisions about its future	Alliances, licensing, market strategy
Cooliris	A young entrepreneur struggles to hire a team	Hiring process, scaling issues

enterprise. In addition, a case study about an actual biotechnology firm, AgraQuest, runs from one chapter to the next.

Business Plans—Methods and tools for the development of a business plan are gathered into one special chapter, which includes a thoroughly annotated table of contents. A sample business plan is provided in appendix A.

Cases—Eight comprehensive cases are included in appendix B. A short description of each case is provided in Table P1. Additional cases from Harvard and ECCH are recommended on this textbook's websites.

References—References are indicated in brackets [Smith, 2001] and are listed as a complete set in the back of the book. This is followed by a list of entrepreneurship-related websites in appendix C and a comprehensive glossary.

Chapter Sequence—The chapter sequence represents our best effort to organize the material in a format that can be used in various types of entrepreneurship courses. The chapters follow the four-part layout shown in Figure P1. Courses focused on creating business plans can reorder the chapters with emphasis on Chapters 7, 10, 12, 17, 18, and 19.

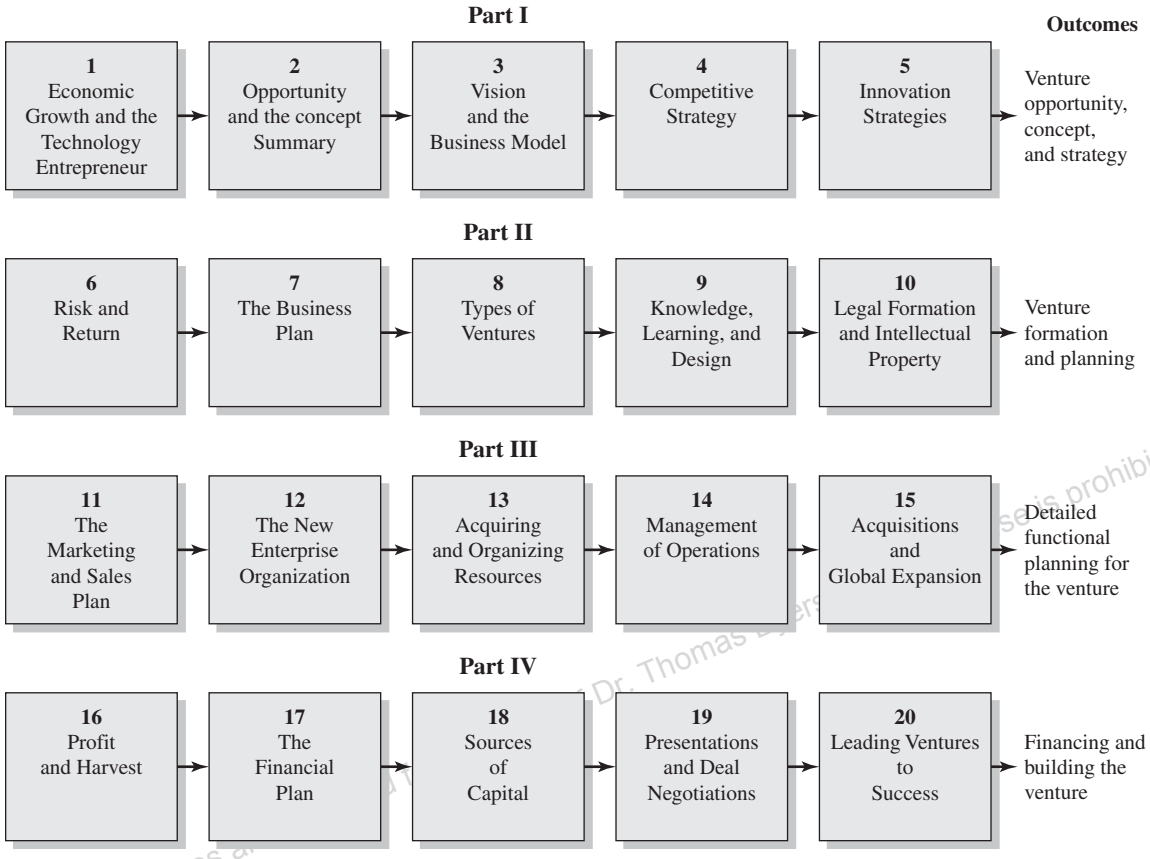

FIGURE P1 Chapter sequence.

Video Clips—A collection of suggested videos from world-class entrepreneurs, investors, and teachers is listed at the end of each chapter and provided on this textbook's websites. More free videos clips and podcasts are available at Stanford's Entrepreurship Corner website (see http://ecorner.stanford.edu).

Websites and Social Networking—Please visit websites for this book at both McGraw-Hill Higher Education (http://www.mhhe.com/byersdorf) and Stanford University (http://techventures.stanford.edu) for supplemental information applicable to educators, students, and professionals. For example, a complete syllabus for an introductory course on technology entrepreneurship and a sample presentation for each chapter are provided for instructors. Visitors to either website can link to the authors' blog and social networking sites for the latest news and advancements in technology venturing and entrepreneurship education.

ELECTRONIC TEXTBOOK OPTIONS

E-books are an innovative way for students to save money and create a greener environment at the same time. An e-book can save students about half the cost of a traditional textbook and offers unique features like a powerful search engine, highlighting, and the ability to share notes with classmates using e-books.

McGraw-Hill offers this text as an e-book. To talk about the e-book options, contact your McGraw-Hill sales rep or visit the site http://www.coursesmart.com to learn more.

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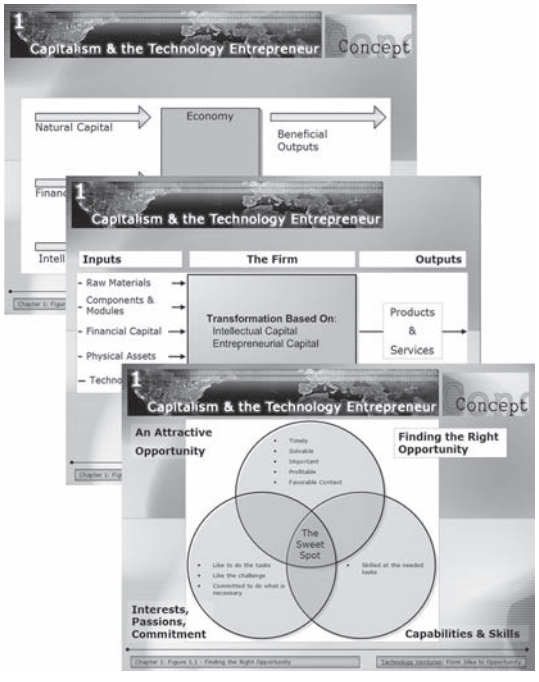
Media Supplements for Students and Instructors

The 3rd edition is supplemented by two websites, collectively bringing students and instructors the most extensive resources available for technology and high-growth entrepreneurship courses. Visitors to either website can link to the authors' blog and social networking sites in order to interact with the authors and other readers.

McGraw-Hill Website
www.mhhe.com/byersdorf

Accessed with a password, the McGraw-Hill website for instructors features:

- Answers to end-of-chapter exercises
- Teaching notes in Word and PDF format for the cases in appendix B
- Extensive sample presentations based on the text



Sample presentations provide instructors with a framework for organizing their lectures, and reference topic-related videos on the textbook's websites.

Media Supplements for Students and Instructors

Stanford University Website
http://techventures.stanford.edu

Rich with content, the author-created Stanford website provides relevant media for each chapter in *Technology Ventures,* including:

- Video clips and podcasts of entrepreneurial leaders including founders, CEOs, venture capitalists, authors, educators, and policy makers.
- Suggested case studies from Harvard Business School and other universities around the globe.
- Resources on how to best integrate the book's business plans and case studies into entrepreneurship courses.
- Links to compelling resources on entrepreneurship (appendix C).
- Additional sample business plans to augment the plan in appendix A.
- A sample syllabus, derived from an actual Stanford University course for students of all majors, includes all sessions with related content and links.
- A news and information feed from the authors' blogs and social networking sites regarding technology venturing and entrepreneurship education.

PART 1

Venture Opportunity, Concept, and Strategy

Entrepreneurs have important roles in creating new businesses that fuel progress in societies worldwide. The entrepreneur uses innovation and technology to foster positive impact and activity in all facets of life. The capable entrepreneur learns to identify, select, describe, and communicate the essence of an opportunity that has attractive potential to become a successful venture. The entrepreneur is able to describe the valuable contributions of a venture and create the design of a business model that can be sustained by a competitive advantage. The venture team creates a road map (strategy) that can, with good chance, effectively lead to the commercialization of the new product or service in the marketplace with a sustainable competitive advantage. ■

CHAPTER 1

Economic Growth and the Technology Entrepreneur

There are risks and costs to a program of action. But they are far less than the long-range risks and costs of comfortable inaction.
John F. Kennedy

CHAPTER OUTLINE

What drives global entrepreneurship?

Entrepreneurs strive to make a difference in our world and to contribute to its betterment. They identify opportunities, mobilize resources, and relentlessly execute on their visions. In this chapter, we describe the characteristics of the people called entrepreneurs and the process they use to create new enterprises. We identify firms as key structures in the economy and the role of entrepreneurship as the engine of economic growth. New technologies form the basis of many important ventures where scientists and engineers combine their technical knowledge with sound business practices to foster innovation. ■

1.1 The Entrepreneur's Challenge

The needs and problems of the world's population are immense. From environmental sustainability to security, from organizational inefficiencies to corruption, from information overload to disease, from transportation to communication, the opportunities for people to create a positive impact are enormous. **Entrepreneurs** are people who identify and pursue solutions among problems, possibilities among needs, and opportunities among challenges.

Entrepreneurship is more than the creation of a business and the wealth associated with it. It is focused on the creation of a new enterprise that serves society and makes a positive change. Entrepreneurs can create great and reputable firms that exhibit performance, leadership, and longevity. In Table 1.1 look at the examples of successful entrepreneurs and the enterprises they created. What contributions have these people and organizations made? What organization would you add to the list? What organization do you wish you had created or been a part of during its formative years? What organization might you create in the future?

TABLE 1.1 Selected entrepreneurs and the enterprises they started.

Entrepreneur	Enterprise started	Age of entrepreneur at time of start	Year of start
Bezos, Jeff	Amazon.com (USA)	31	1995
Brin, Sergey	Google (USA)	27	1998
Dell, Michael	Dell Computer (USA)	19	1984
Gates, William	Microsoft (USA)	20	1976
Greene, Diane	VMWare (USA)	42	1998
Hewlett, William	Hewlett-Packard (USA)	27	1939
Ibrahim, Mo	Celtel (Africa)	42	1998
Lerner, Sandra	Cisco (USA)	29	1984
Li, Robin	Baidu (China)	32	2000
Ma, Jack	Alibaba.com (China)	35	1999
Plattner, Hasso	SAP (Germany)	28	1972
Rottenberg, Linda	Endeavor (Chile, Argentina)	28	1997
Sasaki, Koji	AdIn Research (Japan)	43	1986
Shwed, Gil	Check Point (Israel)	25	1993
Tanti, Tulsi	Suzlon Energy (India)	37	1995
Yunus, Muhammed	Grameen Bank (India)	36	1976
Zuckerberg, Mark	Facebook (USA)	20	2004

Entrepreneurs seek to achieve a certain goal by starting an organization that will address the needs of society and the marketplace. They are prepared to respond to a challenge to overcome obstacles and build a business. As Martin Luther King, Jr. (1963), said, "The ultimate measure of a man is not where he stands in moments of comfort and convenience, but where he stands at times of challenge and controversy."

For an entrepreneur, a **challenge** is a call to respond to a difficult task and the commitment to undertake the required enterprise. Richard Branson, the creator of Virgin Group, reported [Garrett, 1992]: "Ever since I was a teenager, if something was a challenge, I did it and learned it. That's what interests me about life—setting myself tests and trying to prove that I can do it."

Entrepreneurs are resilient people who pounce on challenging problems, determined to find a solution. They combine important capabilities and skills with interests, passions, and commitment. Over nearly a decade, Fred Smith worked on perfecting a solution to what he viewed as a growing problem of organizations to find ways to rapidly ship products to customers. To address this challenge, Smith saw an opportunity to build a freight-only airline that would fly packages to a huge airport and then sort, transfer, and fly them to their destinations overnight. He turned in his paper describing this plan to his Yale University professor, who gave it an average grade, said to be a C. After he graduated, Smith served four years as a U.S. Marine Corps officer and pilot. Following his military service, he spent a few years in the aviation industry building up his experience and knowledge of the industry. Then, he prepared a fully developed business plan for an overnight freight service. By 1972, he had secured financial backing, and Federal Express took to the air in 1973. Federal Express became a new way of shipping goods that revolutionized the cargo shipping business worldwide.

Smith and other entrepreneurs recognize a change in society and its needs, and then, based on their knowledge and skill, they respond with a new way of doing things. Typically, entrepreneurs create a novel response to an opportunity by recombining people, concepts, and technologies into an original solution. Smith saw that the combination of dedicated cargo airplanes, computer-assisted tracking systems, and overnight delivery would serve a new market that required just-in-time delivery of critically important parts, documents, and other valuable items. Smith adapted computer technology to manage the complex task of tracking and moving packages. More fundamentally, Smith matched his passions and skills as a person with a good opportunity.

An **opportunity** is a favorable juncture of circumstances with a good chance for success or progress. Attractive opportunities combine good timing with realistic solutions that address important problems in favorable contexts. It is the job of the entrepreneur to locate new ideas, to determine whether they are actual opportunities, and, if so, to put them into action. Thus, **entrepreneurship** may be described as the nexus of enterprising individuals and promising opportunities [Shane and Venkataraman, 2000]. As illustrated in Figure 1.1, the "sweet

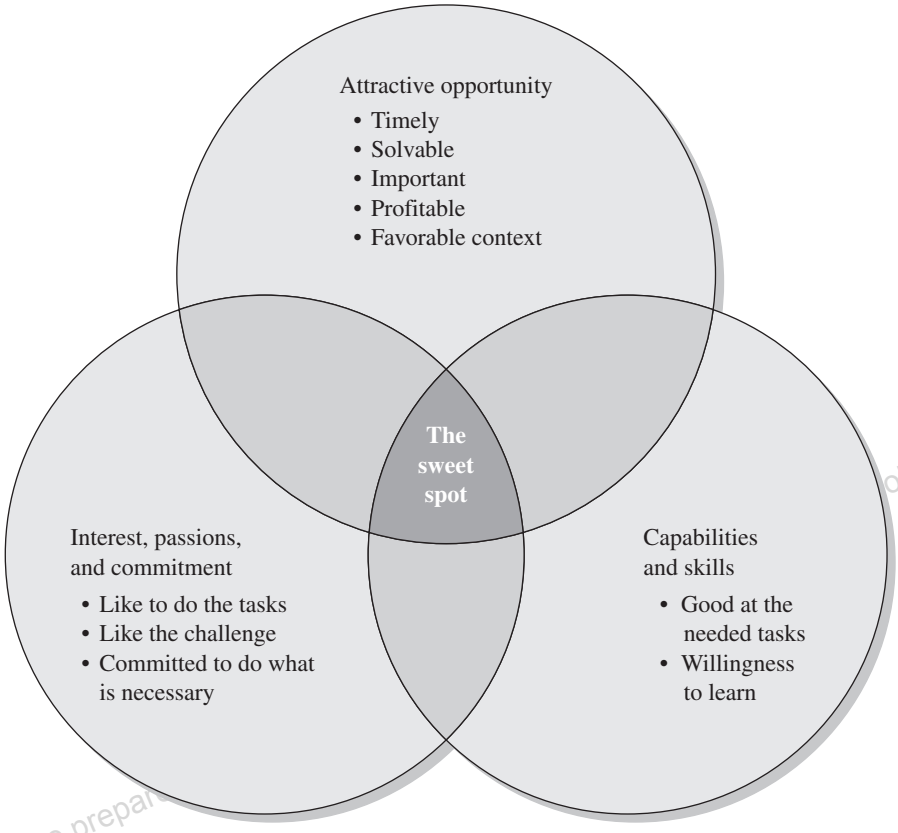


FIGURE 1.1 Selecting the right opportunity by finding the sweet spot.

spot" exists where an individual's or team's passions and capabilities intersect with an attractive opportunity.

Entrepreneurship is not easy. Only about one-third of new ventures survive their first three years. As change agents, entrepreneurs must be willing to accept failure as a potential outcome of their venture. But, regardless of whether the right opportunity has emerged, a person can learn to act as an entrepreneur by trying the activity in a low-cost manner. To avoid the realm of daydreams and fantasy, a person needs to start the practice of experimenting, testing, and learning about his or her entrepreneurial self [Ibarra, 2002]. The would-be entrepreneur should, therefore, engage in this sequence: do it, then reflect on it.

The first step is to craft small experiments in new activities with entrepreneurial teams or small ventures. Through these small experiments, the entrepreneur develops new contacts and mentors, while learning more about the process

TABLE 1.2 Four steps to starting a business.

1.	The founding team or individual has the necessary skills or acquires them.
2.	The team members identify the opportunity that attracts them and matches their skills. They create a solution to match the opportunity.
3.	They acquire (or possess) the financial and physical resources necessary to launch the business by locating investors and partners.
4.	They complete an arrangement or contract with their partners, with investors, and within the founder team to launch the business and share the ownership and wealth created.

of pursuing an opportunity. He or she may also find a challenge that serves as a catalyst for a new venture. If team members identify an opportunity that attracts them and matches their skills, they next obtain the resources necessary to implement their solution. Finally, they launch and grow an organization, which can grow to have a massive impact, like those enterprises listed in Table 1.1. These four steps to starting a business are outlined in Table 1.2.

Ultimately, entrepreneurship is centrally focused on the identification and exploitation of previously unexploited opportunities. Fortunately for the reader, successful entrepreneurs do not possess a rare entrepreneurial gene. Entrepreneurship is a systematic, organized, rigorous discipline that can be learned and mastered [Drucker, 2002]. This textbook will show you how to identify true business opportunities and how to start and grow a high-impact enterprise.

1.2 The Entrepreneur

The entrepreneur is a bold, imaginative deviator from established business methods and practices who constantly seeks the opportunity to commercialize new products, technologies, processes, and arrangements [Baumol, 2002]. Entrepreneurs thrive in response to challenges and look for unconventional solutions. They apply creativity, create visions, build stories that explain their visions, and then act to be part of the solution. They forge new paths and risk failure, but persistently seek success. Entrepreneurs distinguish themselves through their ability to accumulate and manage knowledge, as well as their ability to mobilize resources to achieve a specified business or social goal [Kuemmerle, 2002].

Entrepreneurs engage in eight key activities, as described in Table 1.3. They identify and select opportunities that match their skills and interests, they acquire resources, and they start organizations.

In order to successfully pursue these activities, entrepreneurs should possess several important capabilities, as noted in Table 1.4. Entrepreneurs are opportunity driven and work to find a strategy that can reasonably be expected to bring that opportunity to fruitful success. They seek new means

TABLE 1.3 Eight skills of entrepreneurship.

- Entrepreneurs initiate and operate a purposeful enterprise.
- Entrepreneurs operate within the context and industrial environment at the time of initiation.
- Entrepreneurs identify and screen timely opportunities.
- Entrepreneurs accumulate and manage knowledge and technology.
- Entrepreneurs mobilize resources—financial, physical, and human.
- Entrepreneurs assess and mitigate uncertainty and risk associated with the initiation of the enterprise.
- Entrepreneurs provide an innovative contribution or at least a contribution that encompasses novelty or originality.
- Entrepreneurs enable and encourage a collaborative team of people who have the capabilities and knowledge necessary for success.

or methods and are willing to commit to solving a social or business problem that will result in success. Entrepreneurs work toward needing shorter time periods to decide on an appropriate strategy and seize opportunities. Entrepreneurs have a passion to build an enterprise that will solve an important problem. They seek ways to express themselves and validate their ideas. They are creative, internally motivated, and attracted to new, big ideas or opportunities.

Entrepreneurs exhibit robust confidence, sometimes bordering on overconfidence [Hayward et al., 2006]. Entrepreneurial innovators tend to exhibit high self-efficacy—the belief that they can organize and effectively execute actions to produce desired attainments [Markman et al., 2002]. They believe they possess the capabilities and insights required for the entrepreneurial task. One or

TABLE 1.4 Required capabilities of the entrepreneurial team.

- Has talent, knowledge, and experience within the industry where the opportunity occurs
- Seeks important opportunities with sizable challenges and valuable potential returns
- Able to select an opportunity in a short period: timely
- Creatively explores a process that results in the concept of a valuable solution for the problem or need
- Able to convert an opportunity in to a workable and marketable enterprise
- Wants to succeed: achievement-oriented
- Able to accommodate uncertainty and ambiguity
- Flexibly adapts to changing circumstances and competitors
- Seeks to evaluate and mitigate the risks of the venture
- Creates a vision of the venture to communicate the opportunity of staff and allies
- Attracts, trains, and retains talented, educated people capable of multidisciplinary insights
- Skilled at selling ideas and have a wide network of potential partners

TABLE 1.5 Elements of the ability to overcome a challenge.

■ Able to deal with a series of tough issues	■ Resilient in the face of setbacks
■ Able to create solutions and work to perfect them	■ Willing to work hard and not expect easy solutions
■ Able to handle many tasks simultaneously	■ Well-developed problem-solving skills
	■ Able to learn and acquire the skills needed for the tasks at hand

more of the entrepreneur team usually have some experience in the industry in which the new venture will be operating.

Good entrepreneurs seek to be flexible so they can adapt to changing conditions and reduce the risks of the venture. They are resilient in the face of setbacks, able to multitask, and exercise well-developed problem-solving skills to overcome challenges. Table 1.5 lists some of the elements of this ability.

Finally, entrepreneurs create an overarching vision of the venture and use it to motivate employees, allies, and financiers. Perhaps the most important qualities or characteristics of an entrepreneur are the abilities to accomplish the necessary tasks, meet goals, and inspire others to help with these tasks. Successful entrepreneurial teams attract, train, and retain intellectually brilliant and educated people capable of multidisciplinary insights [van Praag, 2006].

Members of the entrepreneurial team must, therefore, exhibit leadership qualities. **Leadership** is the ability to create change or transform organizations. Leadership within an organization enables the organization to adapt and change as circumstances require. A real measure of leadership is the ability to acquire needed new skills as the situation changes.

Entrepreneurs vary widely in their backgrounds. Recall the list of entrepreneurs in Table 1.1. The age of these people when they launched their enterprises ranges from 19 to 43. The median age of all technology-based company founders is 39 and many founders are much older [Wadha et al., 2008]. Entrepreneurship is a lifelong pursuit that is accessible to people of all ages. Entrepreneurs are also well educated. Ninety-two percent of technology entrepreneurs surveyed by the Kauffman Foundation hold a bachelor's degree, 31 percent hold a master's degree, and 10 percent hold a Ph.D. At the same time, however, institutions such as the Grameen Bank, which lends primarily to women in the third world so that they can start businesses, have opened up entrepreneurship as a possibility for a wide range of people.

In general, entrepreneurs should have most of the qualities listed in Table 1.4 in order to participate in a new venture. But, not everyone will have the same blend of capabilities. In order to strengthen, diversify, and complement an organization's skills, insights, resources, and connections, most entrepreneurs work as part of a team.

Moreover, entrepreneurship is an attitude and capability that diffuses beyond the founding team to all members of an organization. Most growing

TABLE 1.6 Factors people use to determine whether to act as entrepreneurs.

Positive factors or benefits	
■ Independence: Freedom to adapt and use their own approach to work and flexibility of work, autonomy	■ Self-realization: Recognition, achievement, status
■ Financial success: Income, financial security	■ Innovation: Creating something new
	■ Roles: Fulfilling family tradition, acting as leader
Negative factors	
■ Risk: Potential for loss of income and wealth	■ Work effort and stress: Level of work effort required, long hours, constant anxiety

firms strive to infuse the culture of the entire company with the entrepreneurial spirit. For example, Thomas Edison created an enterprise that became General Electric; Steve Jobs and Steve Wozniak founded Apple Computer; and Azim Premji started Wipro Technologies. These entrepreneurs combined their knowledge of valuable new technologies with sound business practices to build important new enterprises that continued to maintain their entrepreneurial spirit for years after founding.

Members of an entrepreneurial team decide whether to act as entrepreneurs based on the seven factors listed in Table 1.6 [Gatewood, 2001]. Good entrepreneurs tend to seek independence, financial success, self-realization, validation of achievement, and innovation, while fulfilling leadership roles. At the same time, potential entrepreneurs evaluate the risk and work efforts associated with an opportunity and balance them with the benefits. Successful entrepreneurs are able to answer positively the five questions listed in Table 1.7 [Kuemmerle, 2002].

Context can have an important effect on whether or not someone becomes an entrepreneur [Sørenson, 2007]. For example, people whose colleagues are entrepreneurial are more likely to become entrepreneurs themselves [Stuart and Ding, 2006]. Similarly, younger and smaller organizations are more likely to

TABLE 1.7 Five questions for the potential entrepreneur.

■ Are you comfortable stretching the rules and questioning conventional wisdom?	■ Are you willing and able to shift strategies quickly?
■ Are you prepared to take on powerful competitors?	■ Are you a good deal closer and decision maker?
■ Do you have the perseverance to start small and grow slowly?	

spawn entrepreneurs [Dobrev and Barnett, 2005]. Environmental changes, such as an increase in the availability of venture capital financing, also affect the decision to become an entrepreneur [Hsu et al., 2007].

On an individual level, people act as self-employed entrepreneurs when that career path is felt to be better than employment by an existing firm. Consider the satisfaction (utility) derived from an employment arrangement. A utility function, U, is [Douglas and Shepherd, 1999]:

$$U = f(Y, I, W, R, O)$$

where Y = income, I = independence, W = work effort, R = risk, and O = other working conditions. It may be assumed that income depends in turn on ability. People will have an incentive to be entrepreneurs when the most satisfaction (utility) is obtained from the entrepreneurial activity. In other words, entrepreneurship pays off due to higher expected income and independence when reasonable levels of risk and work efforts are required.

For new entrepreneurial activities, the results of the venture are less known, and expected returns, independence, work effort, and risk can only be estimated. Potential entrepreneurs must be careful to do an honest assessment of their motivation and skills [Wasserman, 2008]. Regrettably, many entrepreneurs overweigh the benefits of independence and income, and underestimate the work effort required.

Based on the utility function above, we may postulate a utility index that we will call the Entrepreneurial Attractiveness (EA) index [Levesque et al., 2002]. For each factor (Y, I, W, and R), we use a scale of 1 to 5 with 1 = low, 3 = medium, and 5 = high.

$$EA = (Y + I) - (W + R) \tag{1.1}$$

As a simple example, consider the straightforward alternatives for a successful marketing manager in the electronics industry. She can earn $60,000 annually in her existing job (Y in equation 1.1). However, she values the independence of the new venture highly (I). The work effort for the new venture is estimated to be the same as for her current work (W). However, the risk is higher for the new independent venture (R). The potential entrepreneur estimates that she can obtain the same income over the next two years, although she will need a four-month period with a lower income at the start. The entrepreneur can compare the two options across these dimensions as shown in Table 1.8. In this case, over the first two years, the benefits of the new venture are Y + I = 8, and the costs of the venture are W + R = 7. The benefits of the existing job are equal to 5, and the costs are 6. Therefore,

$$\text{New venture: } (Y + I) - (W + R) = 8 - 7 = +1$$
$$\text{Existing job: } (Y + I) - (W + R) = 5 - 6 = -1$$

The new opportunity looks more favorable due to this entrepreneur's desire for independence. Thus, it warrants in-depth analysis.

TABLE 1.8 Summary of the entrepreneur's analysis of a new opportunity and the opportunity cost using a two-year period.

Factor	New venture	Existing job
Income over	$120,000	$120,000
two years (Y)	Y = 3	Y = 3
Independence (I)	I = 5	I = 2
Work effort (W)	W = 4	W = 4
Risk (R)	R = 3	R = 2

In summary, entrepreneurs are multitalented individuals who leverage their capabilities and interests to pursue a particular opportunity, almost always with the help of a team.* The decision to pursue an entrepreneurial path and a particular opportunity is determined by weighing the benefits of independence and income against the work effort required and the risk of the venture. In chapter 2, we learn how a potential entrepreneur can evaluate an idea to determine if it is an actual opportunity.

1.3 Economics and the Firm

All entrepreneurs are workers in the world of economics and business. **Economics** is the study of the production, distribution, and consumption of goods and services. Society, operating at its best, works through entrepreneurs to effectively manage its material, environmental, and human resources to achieve widespread prosperity. An abundance of material and social goods equitably distributed is the goal of most social systems. Entrepreneurs are the people who arrange novel organizations or solutions to social and economic problems. They are the people who make our economic system thrive [Baumol et al., 2007].

According to Global Entrepreneurship Monitor (GEM) researchers, the United States maintained about a 10 percent entrepreneurial activity rate between 1999 and 2007. This indicated that one in ten adults was engaged in setting up or managing a new enterprise during that period, a rate 50 percent higher than the average of all other participating high-income nations [Phinisee et al., 2008]. New ventures have been the source of an estimated one-half to two-thirds of the new jobs created in the United States over the past two decades, meaning start-ups are a key to economic recovery and job growth [Stangler, 2009]. The entrepreneur turns a social problem into an opportunity, a productive organization, and new, well-paid jobs.

*Throughout this book, the word *entrepreneur* will refer to an individual or a team of individuals.

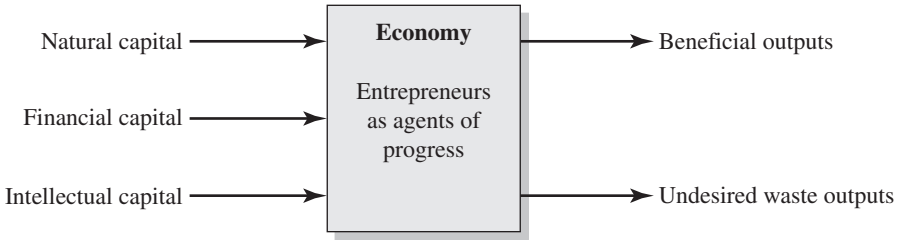


FIGURE 1.2 A model of the economy.

An economic system is a system for the production and distribution of goods and services. Given the limitations of nature and the unlimited desires of humans, economic systems are schemes for (1) administering scarcities and (2) improving the system to increase the abundance of goods and services. For a nation as a whole, its wealth is its food, housing, transportation, health care, and other goods and services. A nation is wealthier when it has more of these goods and services. Nations strive to secure more prosperity by organizing to achieve a more effective and efficient economic system. It is entrepreneurs who organize and initiate that change.

Almost all variation in living standards among countries is explained by **productivity,** which is the quantity of goods and services produced from the sum of all inputs, such as hours worked and fuels used. A model of the economy is shown in Figure 1.2. The inputs to the economy are natural capital, financial capital, and intellectual capital. The outputs are the desired benefits or outcomes and the undesired waste. An appropriate goal is to maximize the beneficial outputs and minimize the undesired waste [Dorf, 2001].

Natural capital refers to those features of nature, such as minerals, fuels, energy, biological yield, or pollution absorption capacity, that are directly or indirectly utilized or are potentially utilizable in human social and economic systems. Because of the nature of ecologies, natural capital may be subject to irreversible change at certain thresholds of use or impact. For example, global climate change poses a serious threat to sources of natural capital.

Financial capital refers to financial assets, such as money, bonds, securities, and land, which allow entrepreneurs to purchase what they need to produce goods and services. The **intellectual capital** of an organization includes the talents, knowledge and creativity of its people, the efficacy of its management systems, and the effectiveness of its customer and supplier relations. The sources of intellectual capital are threefold: human capital, organizational capital, and social capital. **Human capital** (HC) is the combined knowledge, skill, and ability of the company's employees. **Organizational capital** (OC) is the hardware, software, databases, methods, patents,

TABLE 1.9 Three elements of the intellectual capital (IC) of an organization.

Human capital (HC): The skills, capabilities, and knowledge of the firm's people
Organizational capital (OC): The patents, technologies, processes, databases, and networks
Social capital (SC): The quality of the relationships with customers, suppliers, and partners
IC = HC + OC + SC

and management methods of the organization that support the human capital. **Social capital** (SC) is the quality of relationships with a firm's suppliers, allies, partners, and customers. These elements of intellectual capital are summarized in Table 1.9.

The economy as portrayed in Figure 1.2 consists of the summation of all organizations, for-profit as well as nonprofit and governmental, that provide the beneficial outputs for society. These are the organizations that we study and will label as enterprises or firms*. Entrepreneurs constantly form new organizations or enterprises to meet social and economic needs.

The purpose of a firm is to establish an objective and mission and carry it out for the benefit of the customer. Thus, the purpose of Merck Corporation is to create pharmaceuticals that protect and enhance its customers' health. To do so, each individual firm transforms inputs into desirable outputs that serve the needs of customers.

A firm exists as a group of people because it can operate more effectively and efficiently than a set of individuals acting separately. Furthermore, a firm creates conditions under which people can work more effectively than they could on their own. Thus, firms exist to coordinate and motivate people's economic activity [Roberts, 2004]. A firm is more effective because (1) it has lower transaction costs and (2) the necessary skills and talent are gathered together in effective, collaborative work.

A model of the firm as a transformation entity is shown in Figure 1.3. The transformation of inputs into desired outputs is based primarily on the intellectual capital and the entrepreneurial capital of the firm. As an example, consider Microsoft, a powerful software firm. It creates and purchases technologies, develops new software, and builds a client base. The transformation of its inputs into outputs is based on its formidable stock of entrepreneurial capital and intellectual capital.

Entrepreneurial capital (EC) can be formulated as a combination of entrepreneurial competence and entrepreneurial commitment [Erikson, 2002]. **Entrepreneurial competence** is the ability (1) to recognize and envision taking advantage of opportunity and (2) to access and manage the

* Henceforth, we use firm to represent organizations, enterprises, and corporations.

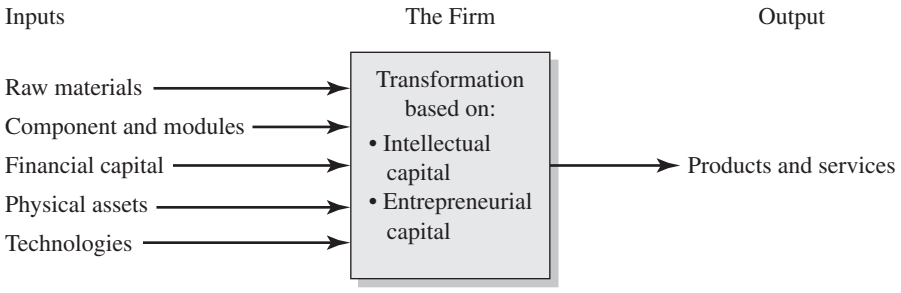


FIGURE 1.3 The firm as transforming available inputs into desired outputs.

necessary resources to actually take advantage of the opportunity. **Entrepreneurial commitment** is a dedication of the time and energy necessary to bring the enterprise to initiation and fruition. The presence of competence without any commitment creates little entrepreneurial capital. The presence of commitment without competence may waste both time and resources. Both commitment and competence are required to provide significant entrepreneurial capital. Thus, we can say that

Entrepreneurial Capital = entrepreneurial competence
× entrepreneurial commitment

or

$$EC = Ecomp \times Ecomm \tag{1.2}$$

where Ecomp is entrepreneurial competence and Ecomm is entrepreneurial commitment. Note that the symbol × is a multiplication sign, but it should be recognized that this equation is qualitative in nature.

The accretion of knowledge and experience over time leads to increased competence as people mature. However, commitment of energy and time may decline when people become less interested in or available for the necessary entrepreneurial competence activities. Both commitment and competence are qualities of the leadership team, and they may be complementary qualities shared among the team members.

To transform inputs into outputs, the firm also acts to develop, attract, and retain intellectual capital. The firm develops and uses intellectual capital to build the strengths of the firm and to provide the desired products.* The firm provides a place where people can collaborate, learn, and grow.

Intellectual capital can be thought of as the sum of knowledge assets of an organization. This knowledge is embodied in the talent, know-how, and skills of the members of an organization. Thus, a firm needs to attract and retain the best people for its requirements in the same way that it seeks the best technologies

* Henceforth, we use products to refer to products and services.

or physical assets. Knowledge is one of the few assets that grows when shared. By organizing around intellectual capital, a new firm strives to leverage it, usually through collaboration, development, and sharing.

The intellectual capital of a firm is used to transform raw material into something more valuable. Antinori succeeds because of the human capital of its grape growers and wine makers. KFC relies on the organizational capital of its recipes and processes. A local café where the waiter recognizes you and knows your favorite latté relies on its social capital. Social capital is based on strong, positive relationships.

The firm's actions are based on its knowledge of its customer, its product, and its markets. The firm must identify and understand its customers, its competitors, and their values and behavior. Knowledge of organizations, design, and technologies is filtered through a firm's strengths and weaknesses. The firm acts on all this knowledge.

First, a firm is clear about its mission and purpose. Second, the firm must know and understand its customers, suppliers, and competitors. Third, a firm's intellectual capital is understood, renewed, and enhanced as feasible. Finally, the firm must understand its environment or context, which is set by society, the market, and the technology available to it. We can call this the **theory of a firm's business,** or how it understands its total activities, resources, and relationships. Figure 1.4 depicts the business theory of

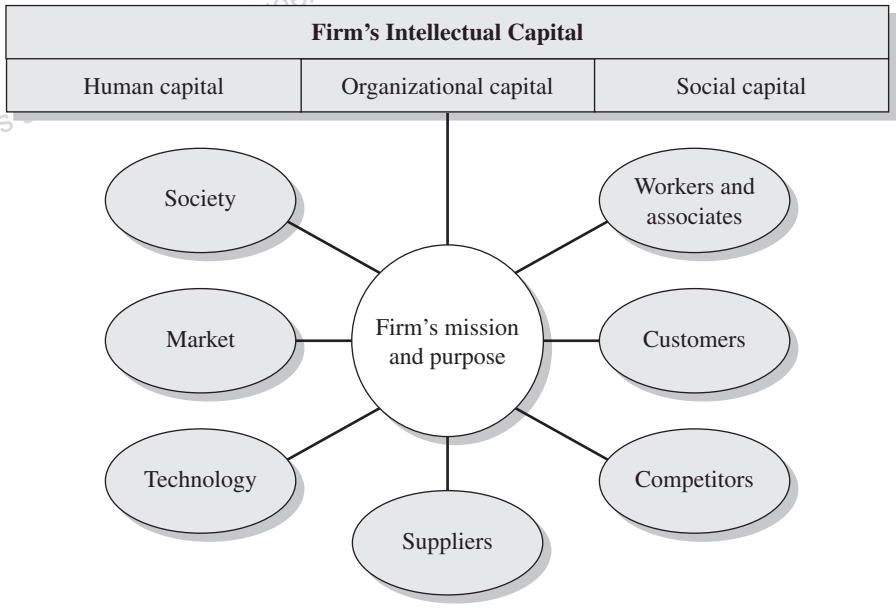


FIGURE 1.4 A firm's theory of business depicts how it understands and uses its total resources, activities, and relationships.

a firm. One hundred years ago, firms were hierarchical and bureaucratic with a theory of business that emphasized making long runs of standardized products. They regularly introduced "new and improved" varieties and provided lifetime employment. Today, firms compete globally with high-value, customized products. They use flattened organizations and base their future on intellectual capital. Firms look to brands and images to cut through the clutter of messages. In the future, a firm's human capital—talent—will become even more important.

One way to look at the future of a firm is as a competition among its stakeholders. Flexibility and leanness mostly benefit the firm's shareowners. Stakeholders include not only these shareholders, but also workers, customers, people in the community, and society in general. Placing a high valuation on talent gives more power to the workers. Customers stand to gain power as competitors vie for their attention. A good reputation means the firm needs to look after its community and society. The entrepreneur in the new firm strives to build a firm that serves all its stakeholders well.

1.4 Creative Destruction

One view of economic activity describes a world of routine in which little changes. In this static model, all decisions have been made, and all alternatives are known and explored. But clearly, no economy is static, and change appears to be certain.

Dynamic capitalism is the process of wealth creation characterized by the dynamics of new, creative firms forming and growing and old, large firms declining and failing. In this model, it is disequilibrium—the disruption of existing markets by new entries—that makes capitalism lead to wealth creation [Kirchhoff, 1994]. New firms are formed by entrepreneurs to exploit and commercialize new products or services, thus creating new demand and wealth. This renewal and revitalization of industry leads to a life cycle of formation, growth, and decline of firms.

The recorded music industry provides a good example of waves of change. Music lovers listened to their favorite music recorded on vinyl discs until about 1980, when cassette tapes grew in popularity. The compact size and recordability of the cassette tape caused a massive shift from vinyl records to tape. By the late 1980s, however, compact discs (CDs) overshadowed cassettes, due to the CD's better sound quality and instant access to tracks. In turn, the CD business peaked in 1995 just as the Internet was gaining momentum in society at large. A few years later, peer-to-peer file transfer began to allow piracy of music. By 2001, Apple had introduced the iPod and iTunes and eventually gained a commanding position in the music distribution and sales business. In a dynamic economy, companies need to reinvent their business arrangements or end up becoming irrelevant [Knopper, 2009].

Joseph Schumpeter (1883–1950) described this process of new entrepreneurial firms and waves of change as **creative destruction.** Born and educated

in Austria, Schumpeter taught at Harvard University from 1932 until his death in 1950. His most famous book, *Capitalism, Socialism and Democracy,* which appeared in 1942 [Schumpeter, 1984], argued that the economy is in a perpetual state of **dynamic disequilibrium.** Entrepreneurs upend the established order, unleashing a gale of creative destruction that forces incumbents to adapt or die. Schumpeter argued that the concept of perfect competition is irrelevant because it focused entirely on market (price) competition, when the focus should be on technological competition. Creative destruction incessantly revolutionizes the economic structure from within, destroying the old structure and creating a new one. The average life span of a company in the Standard and Poors 500 declined from 35 years in 1975 to less than 20 years today. Less than 4 of the top 25 technology companies 30 years ago are leaders today—perhaps only IBM and Hewlett-Packard.

In a world of change, entrepreneurs seek to embrace it. Entrepreneurs match ideas for change with opportunity. These changes include the adoption of new and better (or cheaper) sources of input supplies, the opening of new markets, and the introduction of more profitable forms of business organization.

The profit of the new firm is the key to economic growth and progress. By introducing a new and valuable product, the innovator obtains temporary monopoly power until rivals figure out how to mimic the innovation. Lower costs may give the innovative firm profits higher than those of its rivals, which must continue to sell at higher prices to cover their higher expenses. Alternatively, a superior product may permit a price above that charged by other firms. The same concept clearly fits all forms of successful change. The business system works to drive out inefficiency and forces business process renewal.

Economic progress is reflected in productivity growth, which provides for increases in people's standard of living. Over the past half-century, the U.S. workforce (including immigration) has grown at about 1.7 percent annually, and productivity per worker has risen at 2.2 percent, generating real economic growth (excluding inflation) averaging 3.9 percent. This is an excellent record, due in great part to the impact of technology entrepreneurship.

Rising output per worker comes from two sources: (1) new technology and (2) smarter ways of doing work. Both paths have been followed throughout human history, and they became faster tracks with the coming of the Industrial Revolution. The twentieth century started with new techniques of management and many new inventions. The century ended with smarter management techniques and dramatic advances in electronic technology, which helped revive productivity growth after limited gains through much of the 1970s and 1980s.

The free spirit of entrepreneurs provides the vital energy that propels this capitalist system. During the past 30 years, the forces of entrepreneurship, competition, and globalization have encouraged new technologies and business methods that raise efficiency and efficacy. In recent years, due to competition, many of the benefits of strong productivity have flowed to consumers in the

form of lower prices. Together, innovation, entrepreneurship, and competition are important sources of productivity growth.

1.5 Innovation and Technology

Little doubt now exists that the economy is driven by firms that capitalize on change, technology, and challenge. This book is focused on helping the reader to purposefully become an agent for creative destruction by creating his or her own firm. An example of an agent for creative destruction is Craig Venter, who founded Synthetic Genomics in order to use modified or synthetically produced microorganisms to create ethanol and hydrogen. The company is attempting to capitalize on the growing interest in alternative fuels and to design and synthesize specifically engineered cells to perform particular tasks.

New technologies such as these are often a source of disequilibrium or discontinuity, and Schumpeter's theory was based on disruptive, or "radical," innovations. **Technology** includes devices, artifacts, processes, tools, methods, and materials that can be applied to industrial and commercial purposes. For example, Intel was formed to apply semiconductor technology to the design and manufacture of semiconductor circuits. Microsoft was formed to create and distribute computer software products for applications in industry and the home. Apple has reshaped itself around mobile communications and mobile media technologies.

Modern entrepreneurial firms breed a constant flow of high-impact products that create value and stimulate economic growth by bringing new methods, technologies, and ideas to the global marketplace [Schramm, 2004]. Figure 1.5 illustrates "waves" of innovation based upon different technologies throughout history. Modern entrepreneurial firms are at the forefront of the sixth wave, which places a special emphasis on sustainability.

Population growth and a worldwide rising middle class, combined with tightening energy supplies and fears of climate changes, have prompted a move toward socially and environmentally responsible business. The goal is to provide housing, transportation, and energy systems that use less energy and emit less pollution and carbon dioxide. The concept is to use knowledge and innovation to create and implement sustainable energy systems and to increase resource productivity [Friedman, 2008].

A clean energy system would consist of a mixture of energy generation, transmission, and utilization in ways that best use natural resources and minimize environmental impacts. By clean and green we mean a system based on conservation, best uses of natural resources, and minimizing environmental impacts. Examples of green technology solutions include installing carbon capture systems at power plants, increasing the use of wind power systems, and developing high-efficiency biofuel systems. Improving the reliability and smart control of the electricity grid also offers a good opportunity for entrepreneurs.

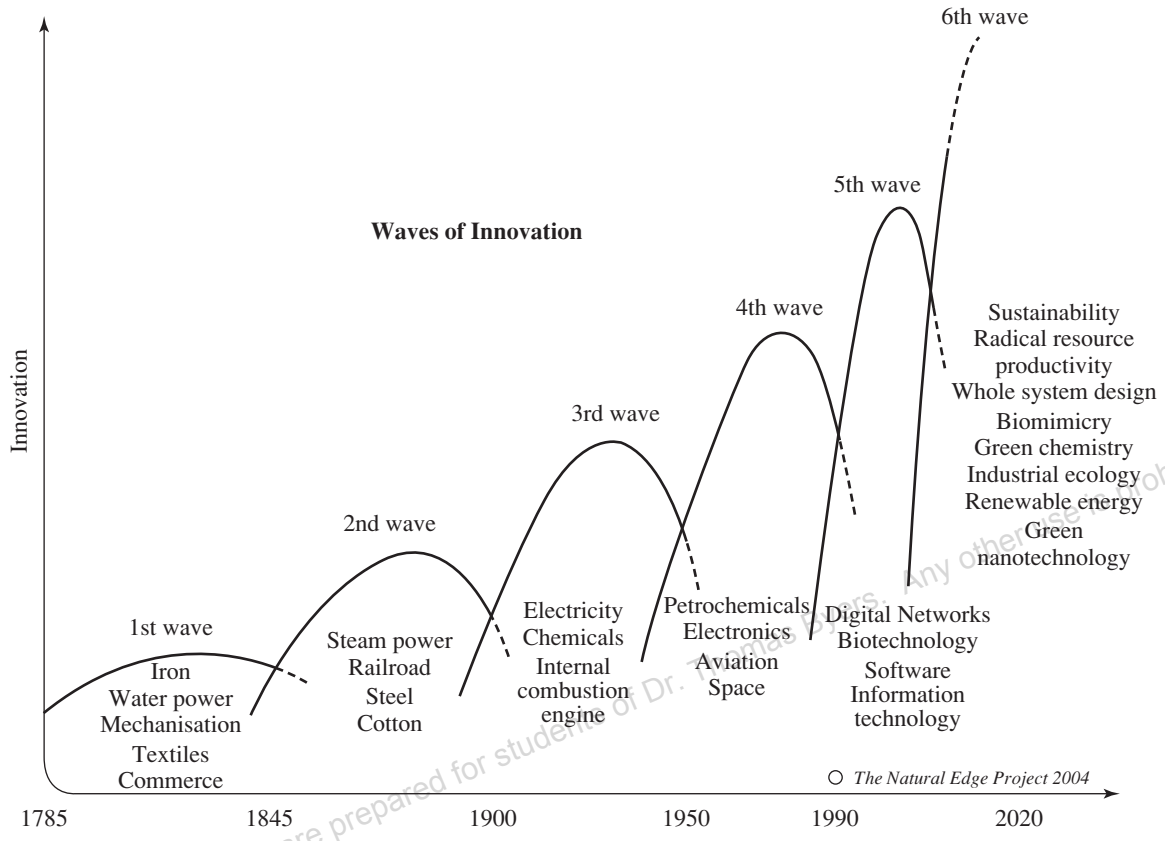


FIGURE 1.5 Waves of innovation throughout history.

As the green technology movement highlights, technology entrepreneurship is based upon intellectual capital. One hundred years ago, successful companies such as U.S. Steel were primarily managing physical assets. By contrast, today's successful firms, such as Microsoft and Genentech, manage knowledge and intellectual capital. In fact, for many, if not most, firms, intellectual capital is the organization's most important asset, more valuable than its other physical and financial assets. Many firms depend on their patents, copyrights, and software, and the capabilities and relationships of their people. This intellectual capital, appropriately applied, will determine success or failure. Thus, knowledge has become the most important factor of production.

While innovation and intellectual property are critical, however, a dynamic economy ultimately rests on the actions of entrepreneurs who assume and accept the benefits and risks of an initiative. It is people acting as leaders, organizers, and motivators who are the central figures of modern economic activity.

Three factors make up entrepreneurial action: (1) a person or group who is responsible for the enterprise, (2) the purposeful enterprise, and (3) initiation and growth of the enterprise. The individuals responsible for the organization were described in section 1.2. The purposeful enterprise may be a new firm organized for a suitable and attractive purpose or a new unit within or separated from an existing business corporation. Furthermore, the organization may be based on radical innovation, incremental changes, imitation, or rent-seeking behavior.

In the first type of enterprise, the entrepreneur engages in an innovative activity that results in novel methods, processes, and products. The second form emphasizes the founding and management of a business that builds upon and improves an existing product or service. The imitative venture is founded by an entrepreneur who is involved in the rapid dissemination of an innovative idea or process. This person or group finds a novel innovation and transfers it to another environment, region or country. The final means of entrepreneurship is called rent-seeking or profit-seeking and focuses on the use of regulation, standards, or laws to appropriate some of the value of a monopoly that is generated somewhere in the economy.

In this book, we emphasize the creation of the venture that capitalizes on technological changes and that will have a significant impact on a region, a nation, or the world. A new regulation or clever financial restructuring may afford the entrepreneur a new opportunity. But, a radical or transforming innovation may provide an entrepreneur an important opportunity to make a productive and very significant contribution to the world as we know it.

1.6 The Sequential Case: AgraQuest

The AgraQuest case illustrates and illuminates the issues raised in each chapter. It focuses on a real-life emerging firm in the life science industry that illustrates each factor described in a chapter. AgraQuest (www.agraquest.com) is an entrepreneurial firm that may significantly contribute to improved environmental and social conditions and agricultural industries around the world. Read the segment on the case at the end of each chapter and learn of a real-life effort that could make a big difference to the world.

Every seven years in the woodsy town of Killingworth, Connecticut, where she grew up, Pamela Marrone would feel the droppings of gypsy moth caterpillars raining down on her head as the cyclical pests gorged on maples and oaks. Desperate to save a heavily infested dogwood, her father once ignored his own organic gardening tenets and blasted the tree with a chemical called a carbamate.

By the next morning, every bee, every ladybird beetle, every lacewing—all the "good" bugs that fed on plant pests—lay dead on the ground. In her youth, Marrone knew that she wanted to keep the good bugs while deterring

bad pests. She recognized a great opportunity that, if solved, could help farmers prosper while using natural pest control agents (not chemicals). Furthermore, as a youth, Marrone had tried, with her parents' encouragement, several modest entrepreneurial ventures at craft fairs and state fairs.

Marrone studied entomology (the study of the forms and behavior of insects) at Cornell University, going on to North Carolina State University, from which she received her doctorate in 1983. She then spent seven years as the leader of the new pest control unit at Monsanto in St. Louis, where she acted on her dedication to the natural control of pests. At Monsanto, Marrone built her technical and entrepreneurial skills. As a result, in 1990 she was recruited by Novo Nordisk, a Danish company, to create a biopesticide subsidiary called Entotech Inc. in Davis, California.

Entotech's goal was to hunt for natural products that can defeat plant scourges without wreaking havoc on human beings, animals, helpful insects, or soil. But in 1995, Entotech was sold to Abbott Laboratories, prompting Marrone to start her own firm to meet the challenge of building a successful company that would use a new search process for identifying natural products for pest control. Thus was born AgraQuest. Marrone possessed the interest and passion, the capabilities and skills, and saw an attractive opportunity in the sweet spot of Figure 1.1.

1.7 Summary

The entrepreneur is the creative force that allows free enterprise to flourish. Entrepreneurship is the process through which individuals and teams bring together the necessary resources to exploit opportunities and in doing so create wealth, social benefits, and prosperity.

The critical ideas of this chapter are:

- The entrepreneur as creator of a great enterprise.
- The entrepreneur responds to an attractive opportunity.
- A person can learn to be an entrepreneur.
- The entrepreneur knows how to use knowledge to create innovation and new firms.
- Positive entrepreneurship activity flows from a combination of entrepreneurial capital and intellectual capital that leads to productivity and prosperity.
- The entrepreneur uses an appropriate organizational structure to achieve his or her goals.

Principle 1
Entrepreneurs develop enterprises with the purpose of creating prosperity and wealth for all participants—investors, customers, suppliers, employees, and themselves—using a combination of intellectual capital and entrepreneurial processes.

Video Resources

Visit http://techventures.stanford.edu to view experts discussing content from this chapter.

Entrepreneurial Skills Learned	Mark Zuckerberg	Facebook
Do What You Like to Get Where You Want	John Melo	Amyris
Technology Cycles Start with a Breakthrough Innovation	Judy Estrin	JLabs
Broad Environmental Solutions Require Brawny Change	Vinod Khosla	Khosla Ventures

1.8 Exercises

1.1 What is the difference between an idea and an opportunity? Why is this difference important to entrepreneurs?

1.2 Consider opportunities that have occurred to you over the past month and list them in a column. Then, describe your strong interests and passions, and list them in a second column. Finally, create a list of your capabilities in a third column. Is there a natural match of opportunity, interests, and capabilities? If so, does this opportunity appear to offer a good chance to build an enterprise? What would you need to do to make this opportunity an attractive chance to build an enterprise business?

1.3 Name an entrepreneur that you personally admire. Why do you consider this person to be an entrepreneur? What sets him or her apart from other business leaders? What path did this person take to entrepreneurship? What personal sacrifices or investments did this person make in the journey? What people were important to this person's success?

1.4 Name a successful entrepreneurial team you personally admire. How would you classify it in the context of the entrepreneur capabilities shown in Table 1.4? Do these elements of entrepreneurship apply to it?

1.5 Research the number of companies that either had an IPO (initial public offering) or have been acquired in the last five years. What industries were these companies in? Where is the number of IPOs vs. M&As (mergers and acquisitions) trend leading? What implications does this have on the number of new ventures being started?

1.6 Given an understanding of the waves of innovation throughout history (Figure 1.5), explore opportunities that are created in a wave after the peak. For example, how can an entrepreneur take advantage of a mature or declining market?

VENTURE CHALLENGE

Select a high-potential opportunity that interests you and then use it for the venture challenge exercises at the end of each chapter. For example, you might consider one of these current trends in science and technology: mobile applications, Internet and services, nanotechnology, clean technologies, pandemic and biodefense treatments, and advancements in stem cell research.

1. Describe the opportunity that attracts you and why you think it is a new venture opportunity.
2. Describe the competencies and skills you and your team members possess.
3. What important stakeholders will you need to be successful?
4. Describe the passion and commitment you have for the opportunity.
5. Is this a good opportunity for you?

CHAPTER 2

Opportunity and the Concept Summary

In the field of observation, chance only favors minds which are prepared.
Louis Pasteur

CHAPTER OUTLINE

How can an entrepreneur identify and select a valuable opportunity?

The identification and evaluation of opportunities is one of the entrepreneur's most important tasks. Good opportunities address important market needs. Examining social, technological, and economic trends can lead to the identification of emerging needs. Entrepreneurs seek to build new ventures and to act on a good opportunity when it matches their capabilities and interests, exists in a favorable context, exhibits the potential for sustainable long-term growth, and facilitates the acquisition of required resources. Such opportunities offer a reasonable chance of success and require the entrepreneur to make a difficult decision to act or not act. The choice of an opportunity and the decision to act is a critical juncture in the life of an entrepreneur. With the decision to act, the entrepreneur prepares a business summary for the venture that is used to test the new venture with potential investors, employees, and customers. The six steps to action as an entrepreneur are shown in Figure 2.1, which summarizes the tasks described in this chapter. ■

2.1 Opportunity Identification

"Every problem is an opportunity." – Vinod Khosla

The first role of the entrepreneur—an individual or a group of people—is to identify and select an appropriate opportunity. An opportunity is a timely and favorable juncture of circumstances providing a good chance for a successful venture. Effective entrepreneurs often find that opportunity identification is a creative process that relates a need to the methods, means, or services that solve the problem. They recognize and pursue opportunities that are based on meeting a need in the marketplace, solving a problem, or filling a niche within a reasonable time. There is timeliness to every opportunity.

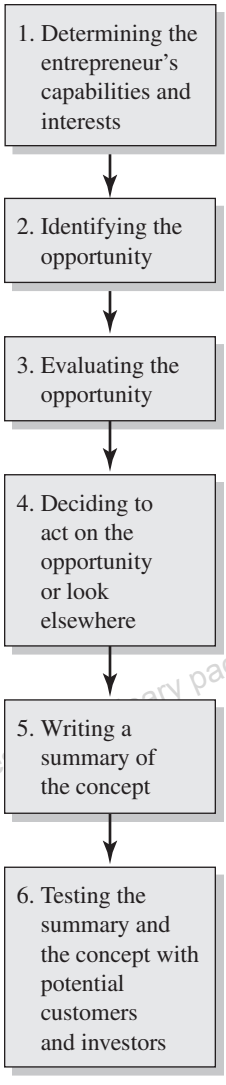


FIGURE 2.1 Six steps to acting as an entrepreneur.

Entrepreneurship begins with an idea that upon reflection is a valuable opportunity. Ideas for new ventures are easy to find but difficult to evaluate. Often the idea will be reviewed by a team or group of creative individuals working together to select a good opportunity. A critical task of the entrepreneur is to distinguish between an idea and an opportunity.

Good opportunities are usually disguised, so most people don't easily recognize them. An entrepreneur's awareness of opportunities is shaped by the people she knows, the activities she pursues, the books and magazines she reads, and other such factors [Ozgen and Baron, 2007]. New opportunities open up because customers' needs change or new technologies lead to new ways of accomplishing tasks. Good opportunities also emerge from circumstances of employment or experience. Often they emerge from the personal experience of a need or problem that cries out for a solution. An example is the need for a pharmaceutical that can mitigate or cure the effects of AIDS. This type of opportunity can be called opportunity pull, since the size of the opportunity draws opportunity seekers to attempt to exploit it. The founders of new industries capitalize on opportunity pull to create disruptive innovations that lead to new products that solve significant problems.

Another type of opportunity occurs from the discovery of a capability or resource that can be applied to a problem or need. An example of this type of opportunity is the discovery of a new technology, such as HDTV in consumer electronics and stem cells in biotechnology. This type of opportunity can be called a capability push, since it flows from a capability or resource availability. New organizational firms and industries are founded by individuals who recognize big opportunities as a result of technological change.

Often, being in the right line of business at the right place and time is the source of good opportunity. For example, Cisco Systems was formed in 1984 to exploit the capabilities of the founders and their associates at Stanford University. The firm was founded by Sandra Lerner and Leonard Bosack, who discovered the capability to enable a router to transmit and translate data to and from disparate computers [Bunnell, 2000]. By 2009, Cisco had revenues of almost $40 billion.

Opportunity Pull at ResMed

Obstructive sleep apnea (OSA) was a widespread but underdiagnosed problem during the 1980s and early 1990s. OSA occurs when tissue at the back of the throat collapses during sleep, blocking the airway and preventing breathing. Oxygen levels drop in the bloodstream causing sharp fluctuations in heart rate and blood pressure. OSA is strongly correlated with other severe conditions—nearly half of all heart failure patients and 60 percent of type 2 diabetes patients suffer from OSA. It was estimated that 2 percent of the U.S. population suffered from OSA in some form. It was clearly a massive problem waiting for a solution.

ResMed was founded in Australia to combat this problem. The company created a novel device that pressurized the airway during sleep to prevent the airway from blocking. The device was fantastically successful and as recognition of OSA expanded during the early 1990s, ResMed took off. ResMed correctly identified a huge unsolved problem and provided a solution that fit into both the patient's life and the health insurers' plans. As a result, the company has been incredibly successful. It is now public on the New York Stock Exchange with revenues of almost $1 billion in 2009.

A good opportunity has the potential to create significant value for the customer. Another way of describing a good opportunity is to describe the customer's pain, which represents the extent of need for the solution to a problem. The pain of need is the converse of value. Thus, a high-value solution is sought by a customer who feels significant pain of need. For example, today's airline customer often experiences a fear of flying. The solution to that problem should lead to the improved value of security of airline travel. Both the customer and the airline want a security solution.

Some would-be entrepreneurs have a new technology and often mistake it for a solution. Customers want a solution to their problem and usually do not care what technology is employed. Unfortunately, some believe that entrepreneurship is having a great technological idea. Entrepreneurship is really about creating a new business that solves a problem.

Successful new ventures are often initiated by people who have experienced significant painful problems. Sam Goldman, the founder of d.light, grew up in Mauritania, Pakistan, Peru, India, and Rwanda before becoming a Peace Corps volunteer in Benin. He then moved on to study biology and environmental studies in Canada before receiving his MBA from Stanford. While Goldman was living in Benin, his neighbor's son was badly burned by a kerosene lamp. This inspired him to create a new source of light, which could match kerosene lamps on price, but be safe for use around small children. d.light now creates extremely efficient LED lights that are 8 to 10 times brighter than a kerosene lamp and 50 percent more efficient than fluorescent lights.

Other new successful ventures occur due to shifts in regulatory policies. The opening of the wireless radio spectrum for mobile devices and cell phones is an example of a big shift in opportunity. We only need look around us to see the proliferation of the wireless revolution.

We can summarize the nine categories of opportunity as shown in Table 2.1. We use these nine categories of opportunity to describe a way of identifying opportunities. The first, and perhaps most common, is to increase the value of the product or service. This can include improved performance, better quality or experience, and improved accessibility or other values unique to the product. For example, Shokay is a for-profit social enterprise based in Tibet that manufacturers and distributes 100 percent yak down products including scarves and throws. The products are sourced from impoverished Tibetan yak herders with the broader mission of fostering economic development to remote areas of western China. Their products are luxurious, soft, functional, and have wide appeal.

The second category seeks new applications of existing means or technologies. Credit cards with magnetic stripes were available in the 1960s, but a thoughtful innovator recognized the application of this technology to hotel door cards and created a wholly new application and industry.

The third category concentrates on creating mass markets for existing products. A good example is the introduction of the disposable camera, which is often used at weddings or parties.

Customization of products for individuals, category 4, affords a new opportunity for an existing product or technology. Examples of customization can be found in the personal computer industry. Dell Computer is a good example of a company that offers customization.

Expanding geographic reach or online reach, category 5, allows a new venture to increase its number of customers. Founded in Scotland, Optos developed a novel eye exam technology and innovative pay-per-use business model. Backed by angel investors for many years, it carefully expanded its operations into the U.S. and Germany markets. It is now a viable public company listed on the London stock exchange.

TABLE 2.1 Nine categories of opportunity.

1.	Increasing the value of a product or service
2.	New applications of existing means or technologies
3.	Creating mass markets
4.	Customization for individuals
5.	Increasing reach
6.	Managing the supply chain
7.	Convergence of industries
8.	Process innovation
9.	Increasing the scale of the firm

Managing the supply chain, category 6, is a powerful force for improvement. Wal-Mart used its distribution system and large stores connected to an inventory information system to reap the economic benefits of inventory management.

Convergence of industries, category 7, affords potential benefits to innovative teams. For example, genetic engineering is the convergence of electron microscopy, micromanipulation, and supercomputing.

Innovation of business and manufacturing processes, category 8, is another source of opportunity. For example, the shipping of goods has been greatly changed by the introduction of FedEx and other airborne shipping systems.

Finally, the ninth category of opportunity is the increasing scale or consolidation of industry. Historically, the railroad industry provides a powerful example of consolidation in the United States. Consolidation of the railroads began by the turn of the twentieth century. Today, there are five major railroad companies, down from the thousands of companies in the late 1890s. More recent consolidation examples include the personal computer and video rental industries. Through mergers and acquisitions, an industry can be consolidated with attendant cost savings and value for the customer.

Great opportunities are often disguised as difficult problems. For example, Scott Cook saw a problem experienced by individuals who wanted to easily and reliably keep their own home budget records, do their taxes, and pay the bills. He thought that problem could be solved by using a personal computer. The software program his new firm developed was intuitive and easy to use so that most people could use it without resorting to the manual—thus, the name of the firm: Intuit (www.intuit.com). Scott Cook solved a big problem with an easy-to-use solution. The identification of problems depends on preparation, experience, competence, and a keen sense of observation. Entrepreneurs like Cook leverage their curiosity and an observant nature.

Once a problem has been identified, a solution can be deduced by first asking, "How would an unconstrained person solve the problem?" Starting without constraints such as price and physical limits opens up many possibilities. Once a good unconstrained solution appears attractive, it can often be rearranged to accommodate reasonable constraints [Nalebuff and Ayres, 2003].

The power of *serendipity*—making useful discoveries by accident—can also lead to good opportunities. Working in a microwave lab, Percy Spencer observed a chocolate bar melting by microwave power—thus, leading to the microwave oven. Clarence Birdseye was a fur trader in Canada when he noticed a phenomenon while ice fishing. At 50 degrees below zero, fish froze rock-hard almost instantly, yet when thawed, they were fresh and tender. After some experimentation, he learned that the key was the speed at which foods were frozen. That observation led to the flash freezing process that created a multi-billion dollar industry and made Birdseye a success.

Another means of finding a good opportunity is to look for a discontinuity in culture, society, or markets. Table 2.2 describes examples of discontinuities that lead to a big opportunity. An example of a big opportunity is addressing

TABLE 2.2 Sources of discontinuities.

Society	Technology	Markets
■ Aging society	■ Innovation	■ Deregulation
■ Lifelong education	■ Disruptive technologies	■ Supply chain disruption
■ Food and population	■ New knowledge	■ Globalization
■ Regulation		

the need for creation of new pharmaceuticals to help prevent the increasing incidence of Parkinson's and Alzheimer's diseases among older people.

Any specific business opportunity may be portrayed in the three-dimensional cube of Figure 2.2. The entrepreneur identifies the customer, the required technology, and the application of this technology to create a solution. Several websites for identifying new ideas are listed in appendix C.

Good opportunities display the characteristics of a potential to solve important problems within economic constraints. Usually, they will look attractive because they can be profitable to the new venture as well as valuable to the

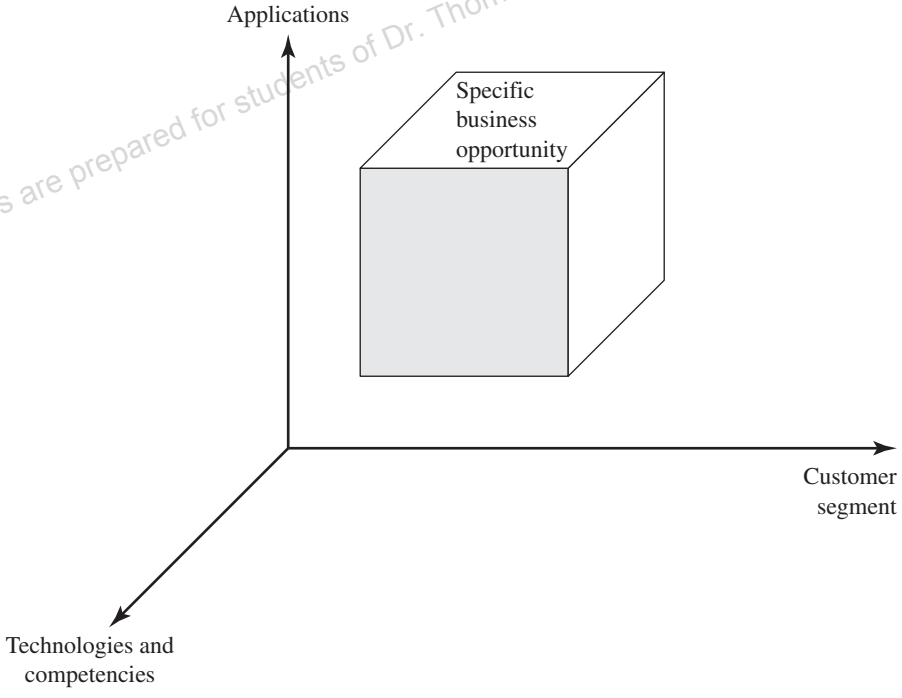


FIGURE 2.2 Finding a specific business opportunity with a combination of customer segment, technology and competencies, and applications.

TABLE 2.3 Five characteristics of an attractive opportunity.

■ Timely—a current need or problem	■ Profitable—the customer will pay for the solution and allow the enterprise to profit
■ Solvable—a problem that can be solved in the near future with accessible resource	■ Context—a favorable regulatory and industry situation
■ Important—the customer deems the problem or need important	

customers. An attractive opportunity displays the five characteristics listed in Table 2.3. The entrepreneur seeks a timely, solvable, important problem with a favorable context that can lead to profitability.

It is the entrepreneur who adds value to the opportunity by creating a response to a good opportunity. The opportunity, and a general response to it, is not unique—many recognize it but few possess the relevant passion to solve the problem as well as the capability to do so. For example, many people propose to exploit the new science of nanotechnology to solve various problems, but few of them will act. The true entrepreneur finds the best opportunity that matches his or her interests, skills, and knowledge—and acts to get it done. Thus, it is really the passion and capabilities that distinguish the entrepreneurial team. The selection process consists of looking for the best match of opportunity, capabilities, and interest (passion).

Jeremy Jaech is a good example of an entrepreneur who found this match. Jaech attended the University of Washington, receiving a BA in mathematics in 1977. He joined the computer science graduate program after graduation, completing his master's degree in 1980, while working at Boeing on computer graphics. In 1983, he joined Atex, a maker of computer systems for newspapers. After nine months, Atex closed the facility where he worked, and Jaech needed to find an opportunity for himself. His capabilities were in computer programming for graphics, and his interest was to achieve independence and success. His passion was for developing software for desktop computer graphics. His former boss at Atex suggested they form their own company that would create software for desktop computer graphics. Jaech was a good technical leader, and his boss was a good manager; together, they made a solid team. In 1984, the two men founded Seattle-based Aldus Corporation, which created the software called PageMaker, which launched desktop publishing on personal computers.

By 1989, although Aldus had grown, Jaech was faced with a new challenge. He wanted to broaden the product line, but his partner/CEO wanted to remain focused on desktop publishing. Jaech saw an opportunity to create a Windows-based software product for general-purpose drawing. He matched his capabilities with his interests and in 1990 started a new firm that was later called Visio Corporation. When the company's first product was shipped in 1992, it had 14 employees. It went public as a 200-person company in 1995 and was eventually purchased in January 2000 by

Microsoft Corporation for $1.5 billion in stock. Jaech had exploited two successive opportunities: Aldus and Visio both used his ability to design software while matching his capabilities and skills with his passions and interest to create two important companies. Jaech is now CEO of Verdium, which is an enterprise software venture that helps customers reduce energy consumption.

2.2 Trends and Convergence

Trends in technologies and demographics can lead to large opportunities. For example, just 30 years ago online shopping and mobile phones were far-off dreams. Today, hundreds of millions of people shop online and mobile phones are widespread on every continent. Opportunities abound in medicine, agriculture, materials, energy, transportation, housing, computers, and education, to mention a few industries.

The world's food supply and nutritional sources will get a big boost from biotechnology in the decades ahead. Biotech's benefits will include more environmentally friendly agriculture. Farmers will have more tools to combat pests, overcome difficult conditions, and grow more food from fewer acres and resources.

Crops may be designed with built-in resistance to diseases and pests, boosting yields worldwide. This is already being done with corn, cotton, and soybeans. Plants will also be endowed with new tolerance to weather, greatly expanding the land area where grains and vegetables can be profitably grown. Genetic engineering will also produce trees that grow faster or resist disease.

The trend toward globalization of business is based on the negation of time and distance with the emergence of the Internet and overnight shipping. With a billion new capitalists in Asia, "globalization is a mega-trend that will shape all other trends" [Prestowitz, 2005].

As prosperity grows and spreads worldwide, many opportunities occur from lifestyle changes. Starbucks, for example, offers a quality, customized coffee product and makes it broadly available. Other premium product segments such as wine, gifts, and flowers will grow with prosperity. Entrepreneurs should try to identify destabilizing influences. These come about through technological change, as well as through changes in taste. Entire industries can be made or broken by a shift in fashion. For example, the replacement of silk stockings by nylon ones led to the popularity of synthetic fabrics in clothing generally.

Demographic and cultural trends offer many examples of opportunity. Several social and cultural trends are listed in Table 2.4. The biggest current trend in America is the aging of the baby-boom generation—those born between 1946 and 1973. During those years, 107.5 million Americans were born, making up 50 percent of everyone alive in 1973 [Hoover, 2001]. Those born in the peak-birth year of 1961 will be 50 in 2011 and acting as wealthy consumers of goods and services such as new homes, furniture, travel, and retirement plans.

Sirtris and the Battle Against Age-Related Diseases

Sirtris was founded to address some of the diseases that are strongly associated with age. Many industrialized nations are seeing massive demographic shifts as the average age of their population consistently increases. Countries like Japan are confronting whole new problems as large portions of the population retire, but are still expected to live for another generation. Sirtris is hoping to address this problem by creating drugs to combat diseases like Alzheimer's, diabetes, and cancer. These drugs not only would improve quality of life for the elder portion of the population, but also would allow it to remain in the workforce longer. This could have massive implications for everything from health care costs to Medicare and Medicaid.

TABLE 2.4 Social and cultural trends that will create opportunities.

- Aging of the baby-boom generation
- Increasing diversity of the people of the United States (e.g., Latino population)
- Two-working-parent families
- Rising middle class of developing nations
- Changing role of religious organizations
- Changing role of women in society
- Pervasive influence of media—television, DVDs, Internet

Other critical trends include the rise of diversity as massive waves of immigrants arrive in the United States and as the role of women changes in many societies and nations in the world. Any new enterprise must fit the social and cultural context of its service area. One of the most promising areas of science and engineering is based on several breakthroughs that enable the manipulation of matter at the molecular level. Mass production of products with these molecular adjustments now offers a world of possibilities. Nanotechnology will make materials lighter, more durable, and more stain resistant. (One nanometer is one-billionth of a meter.) Soon we may also get a host of miniaturized products, from semiconductors to pumps that work more efficiently and accurately. The areas of application range from medical and industrial to the home [Ratner and Ratner, 2004].

Tiny robots acting in coordinated teams may be used in events such as fires, toxic spills, and bomb threats. This activity, like that depicted in the movie *Minority Report,* can be used for safety and reconnaissance activities [Grabowski et al., 2003]. Companies such as iRobot have recently marketed robots that have been used in dangerous military and firefighting situations.

Another example of a current trend that results in a big problem is the unsolicited e-mail (spam) that is received by all e-mail users. In 2009, 85 percent of

TABLE 2.5 Trends and opportunities.

- Life science: Genetic engineering, genomics, biometrics
- Information technology: Internet, wireless device, cloud computing
- Food preservation: Improved distribution of food
- Video gaming: Learning, entertainment
- Speech recognition: Interface between computers and people
- Security devices and systems: Identification devices, baggage checkers, protective clothes
- Nanotechnology: Devices 100 nanometers or less for drug delivery, biosensors
- Renewable energy: Solar cells and wind turbines
- Fuel cells: Electrochemical conversion of hydrogen or hydrocarbon fuels into electric current
- Superconductivity: Energy savings on utility power lines
- Designer enzymes: Protein catalysts that accelerate chemical reactions in living cells for consumers and health products
- Cell phones: Communications and computing
- Software security: Blocking unsolicited e-mail (spam), preventing "phishing"
- Robots: Teams of small coordinated robots for monitoring and safety functions

all e-mail messages sent over the Internet were spam. Any new firm that can sell a foolproof spam blocker would solve a problem for most e-mail users.

With the need for security and safety of personal information, the emergence of personal identification cards, or smart cards, may be the next trend in America. Cards for pay telephones and money transfer are one application. Another important use of smart cards would be a common approach for driver's licenses and personal information. A smart card is a plastic card incorporating an integrated circuit chip and memory that stores and transfers data such as personal data and identification information such as finger or palm print or facial scans. These cards have been adopted in several European and Asian countries and could spread worldwide. One form of smart card, the Octopus Card, is used in Hong Kong to pay for everything from subway rides to groceries.

Table 2.5 lists some important technology trends and opportunities for the future. Perhaps the most important advances will come from the energy and environment sectors.

Moreover, the boundaries between many once-distinct businesses, from agribusiness and chemicals to pharmaceuticals and health care to energy and computing, will continue to blur. The **convergence** of technologies or industries is the coming together or merging of several technologies or industries thought to be different or separate. Often they emerge from creative combinations that build on complementary technologies. One example of industry convergence is that of computing and communications, which merged into the field of networks. Another example is convergence of a handheld computer and a cell phone. The idea is to let users carry just one device instead of two or three and still stay connected via

voice, e-mail, or data. Observers say the devices could be a boon to the wireless industry. Large innovations emerging from convergences can drive growth and create vistas of opportunity [Mandel, 2004].

An excellent example of the convergence of two technologies leading to an opportunity is the development of global positioning systems (GPS) and their wide use by hikers, travelers, surveyors, and farmers. Satellite imaging and data and the handheld computer converged into the GPS device, which is a widely used, inexpensive device that addresses the need for accurate locational data.

Think creatively about possible convergences. How about the convergence of scanners, computers, and security systems that enables shoppers to bag their own groceries in a self-checkout system? Or, consider a gene chip that uses semiconductor technology to speed up gene lab analysis. Another example is the new world of medicine driven by innovation and the needs of aging Americans for ever-more-intense levels of care. Already, the United States spends $2.3 trillion, or 16 percent of its gross domestic product, on medical care. The health care transformation could be as big as the computer revolution.

Another big trend is the convergence of the computer and communications and the trend toward wireless phones and devices, as illustrated in Figure 2.3. Cell phones become more like computers, and handheld computers transform to phones [Lohr, 2003a]. People are excited by the opportunities as wireless

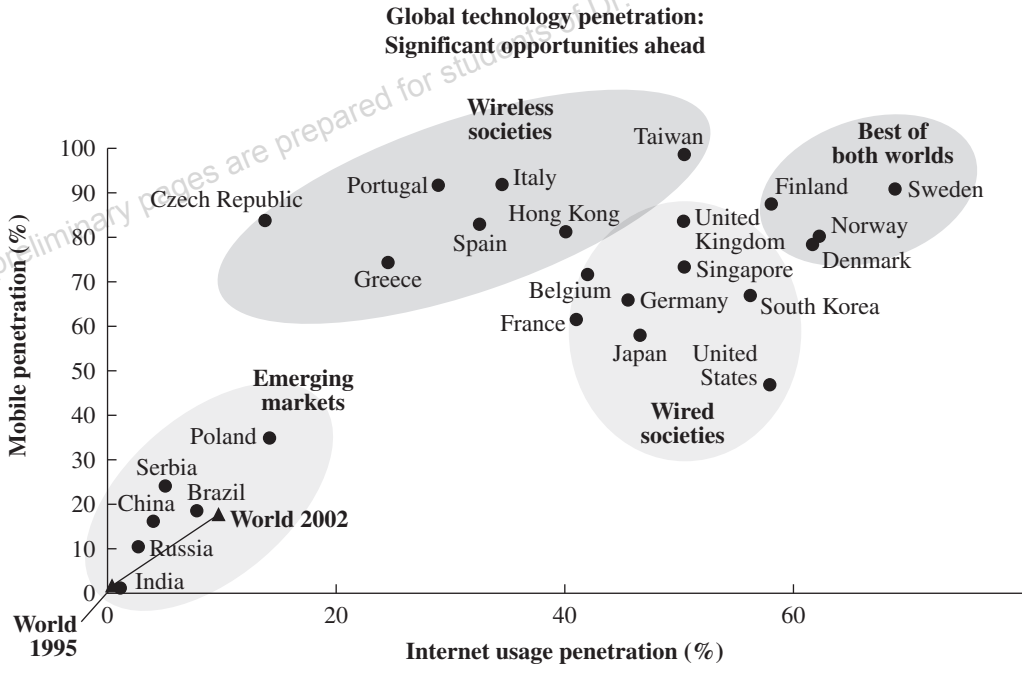


FIGURE 2.3 Convergence of the Internet and mobile phone usage in the world.
(*Source:* Applied Materials Corporation.)

start-ups proliferate. Another trend is the convergence of medical and robotic technology. As robotic devices become more advanced, they are increasingly finding broader applications in the world of medicine. Intuitive Surgical manufactures robots that can help surgeons perform certain operations with greater precision and accuracy. Its da Vinci medical robot has four arms and flexible wrists mounted with tools and cameras that can be controlled by a surgeon. The robots are being used for prostate surgeries, hysterectomies, and more complicated surgeries like heart valve repair. Effective entrepreneurs look for a new technology in one industry that can be applied in another one—and they are savvy at identifying future trends as a result.

2.3 Opportunity Evaluation

Choosing the right opportunity is a difficult and important task. We select the opportunity that affords the best chance of success within the context of the marketplace. This choice is analogous to the selection of an equity investment in a company. Entrepreneurs will invest time, effort, and money in the venture they choose in a manner similar to how people invest in the stock of a company. Some sound investment principles that can be used for selecting opportunities are listed in Table 2.6.

The entrepreneur finds and thoroughly analyzes the best opportunities, since for many people, only one or two are needed to make a good life of entrepreneurial activity. One goal is to invest in a firm for which you pay less than it is worth; this provides some cushion for unforeseen challenges. Also, entrepreneurs try to find an opportunity with solid long-term potential in an industry they understand. They put together a good management team that can execute the strategy for this opportunity. And, they ensure that the customer will allow their firm to profit from the venture. Thus, they avoid industries that sell commodities where price is the only differentiation unless they have a new, innovative business process that enables their firm to be the low-cost provider.

TABLE 2.6 Guiding principles for selecting good opportunities.

- Only one or two very good opportunities are needed in a lifetime.
- Invest less time, money, and effort in the venture than it will be worth in one or two years. Calculate the probability of a large return in four years.
- Do not count on making a high-priced sale of your firm to the public or another company.
- Carry out a solid analysis of the current and expected conditions of the industry where the opportunity resides.
- If the opportunity is selected and turns out unfavorably, can you exit with minor losses?
- Does this opportunity provide a potential for a long-term success, or is it a fad? Go to where the potential future gains are significant.
- Can the management team execute the strategy selected for this opportunity?
- Will the customer enable your firm to profit from this venture?

Tom Stemberg, the founder of Staples, conceived the idea of a supermarket store for office supplies in the mid-1980s. He didn't like the politics of big companies and sought independence. He started with a single store in Brighton, Massachusetts, and built 1,500 outlets. He carried out a complete analysis of the opportunity and determined it was a $100 billion market growing at 15 percent per year with large profit margins.

The review of opportunities will always include the evaluation of alternatives. The **opportunity cost** of an action is the value (cost) of the forgone alternative action. Selecting one opportunity will involve rejecting others. Chapter 1 discussed some of the considerations that people should use when deciding whether to become an entrepreneur by pursuing a specific opportunity. A critical part of this decision hinges on the quality of the opportunity in terms of a market assessment, feasibility of implementation, and differentiation of the product. Much of this analysis requires additional information. Judgment regarding the qualities of the opportunity can be made by the entrepreneurial team as it considers all the aspects of the opportunity. A comprehensive analytical approach to evaluation of the opportunity does not suit most start-ups. Entrepreneurs often lack the time and money to interview a representative cross section of potential customers, analyze substitutes, reconstruct competitors' cost structures, or project alternative planning scenarios.

Most entrepreneurial teams instead follow a basic five-step process, as outlined in Table 2.7. The goal is to quickly weed out unpromising ventures and conserve energy and time for the promising ones. In general, it is best to reject ventures in industries or markets in which the entrepreneurs have little experience or knowledge. Standard checklists or approaches don't work for most entrepreneurs. The appropriate analytical effort and the issues that are most worthy of research and analysis depend on the characteristics of each venture. For example, the exploration process should be short for potential ventures with low degrees of novelty [Choi et al, 2008]. In general, however, an entrepreneur works through the five steps and eliminates the opportunities that do not pass muster. Those that do pass a quick review are worth looking into further.

TABLE 2.7 Basic five-step process of evaluating an opportunity.

1.	**Capabilities:** Is the venture opportunity consistent with the capabilities, knowledge, and experience of the team members?
2.	**Novelty:** Does the product or service have significant novel, proprietary, or differentiating qualities? Does it create significant value for the customer—enough so that the customer wants the product and will pay a premium for it?
3.	**Resources:** Can the venture team attract the necessary financial, physical, and human resources consistent with the magnitude of the venture?
4.	**Return:** Can the product be produced at a cost so that a profit can be obtained? Is the expected return of the venture consistent with the risk of the venture?
5.	**Commitment:** Do the entrepreneurial team members feel compelled to commit to this venture? Are they passionate about the venture?

The iPod Opportunity

In the late 1990s, many people had been listening to music stored on their computer that was obtained through the Napster file-sharing service. The challenge was to design and sell a portable music storage and player device. Tony Fadell, who had worked at General Magic, started his own company, Fuse, to design consumer electronic products. He tried to secure financing for the design of a portable music player. Without financing, he went to Apple in February 2001 as a contractor and then in April 2002 joined Apple as an employee to lead the iPod project. Fadell and Apple together recognized that the iPod opportunity possessed all the characteristics of Table 2.7. The capabilities, resources, and commitment of Apple and Fadell enabled them to build a device, the iPod, that was truly novel and that could offer a significant return.

It is difficult for many to ascertain their dreams and goals. Often it helps to write them down. Keep revising them until you are sure of them. John James Audubon was a taxidermist who had a passion for painting the birds of America. By 1829, he published the first of his famous four volumes entitled *The Birds of America.* Most of the paintings were life-size. His opportunity became a life's work and a legacy that we value today.

The entrepreneur has to live with critical uncertainties, such as the relative competence of rivals or the preferences of customers, which are not easy to analyze. Who could have forecast, for example, that IBM would turn to Microsoft for an operating system for its personal computer, allow Microsoft to retain the rights to this operating system, and thus gain monopolistic dominance of the operating system marketplace? Entering a race requires faith in one's ability to finish ahead of whoever else might participate.

A new product has to offer customers exceptional value at an attractive price, and the company must be able to deliver it at a good profit. The initial opportunity review can be based on the five characteristics of the opportunity and its assessment by the team: capabilities, novelty, resources, return, and commitment, as depicted in Table 2.7.

When evaluating an opportunity, the entrepreneur considers whether it fits or matches the contextual conditions, the team's capabilities and characteristics, and the team's ability to secure the necessary resources to initiate a new venture based on the opportunity. Figure 2.4 shows a diagram of fit or congruence that can be used to review an opportunity. A big diamond with high grades of fit are best.

Consider an opportunity that has existed for over 100 years—the electric automobile. We will assume that a capable set of engineers is available and the entrepreneurial team has the attitudes and capabilities required. However, the team is insecure about the risky nature of the venture, given the numerous failures over the past century. We will rate the entrepreneurial team at 75 percent on the team scale. The characteristics of the context are very mixed since regulations and

A Big Opportunity in Television

What is the next big opportunity in television? Flat-panel television has been one of the compelling trends in consumer technology. A switch from the bulky cathode-ray tube to flat panel displays is under way in the multi billion unit global market. Opportunities exist in the market for glass and the devices and chips for digital light processing. Another opportunity is making the sets and selling them. As nations switch to high-definition TV (HDTV), the market for flat panel displays has grown significantly. Which of these opportunities pass the evaluation process of Table 2.7?

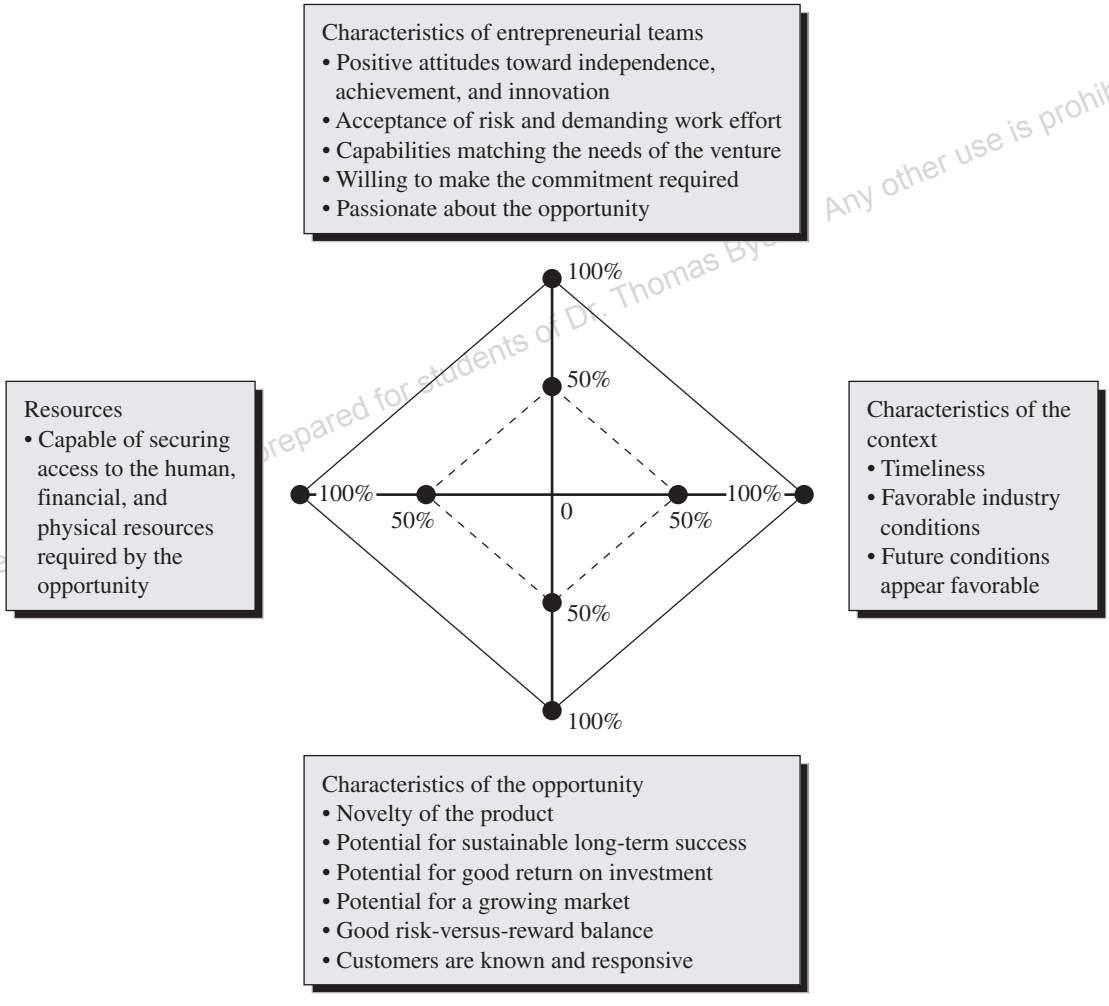


FIGURE 2.4 Diagram of the fit of an opportunity, the context, the entrepreneurial team, and the resources required. Rate each factor on a scale of 0 to 100 percent.

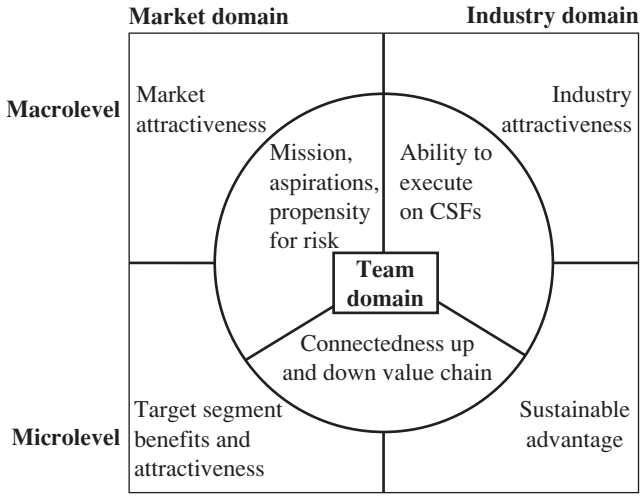


FIGURE 2.5 The seven domains of attractive opportunities.
(*Source:* Mullins, 2006.)

support for electric cars are continually changing as potential customers and government organizations adjust their assessment of the benefits and costs of these vehicles. We will rate this opportunity as only 50 percent on the context scale. Next we turn to the opportunity, which is challenged by costs, limited life batteries, and short ranges before a recharge is required. The characteristics of the opportunity call for a rating of 75 percent on the opportunity scale. Given these ratings, most teams would be severely limited in their ability to secure the tens of millions of dollars required to launch this venture. Thus, we rate it only 50 percent on the resource scale. Clearly, this opportunity is a challenging one. Without a technical breakthrough in battery performance and cost, electric autos have a risky future—valuable as an electric car might be to the environmental conditions of auto-impacted regions such as Los Angeles and Beijing.

Another way of envisioning the concept of a fit with an opportunity is shown graphically in Figure 2.5. Both markets and industries must be examined on the macrolevel and the microlevel. Moreover, the team must be evaluated across multiple dimensions. An ideal opportunity lies where the market and industry are attractive, customer benefits are compelling, the start-up's advantage is sustainable, and the team can deliver the results it seeks [Mullins, 2006].

After evaluating an opportunity by using the factors in Table 2.7, the entrepreneurs should decide whether to act. With the knowledge generated by using the five-step process in Table 2.7, the entrepreneurs will tend to act on their estimate of the potential benefits and gains, B, while accounting for the total costs of the venture, C. Within the total cost accounting, there will need to be a recognition of their security needs and loss aversion. An individual will tend to act if the ratio B/C is greater than 1. The lucrative opportunity (high benefits and low losses) will tend to cause higher intention to act [McMullen and Shepherd, 2002].

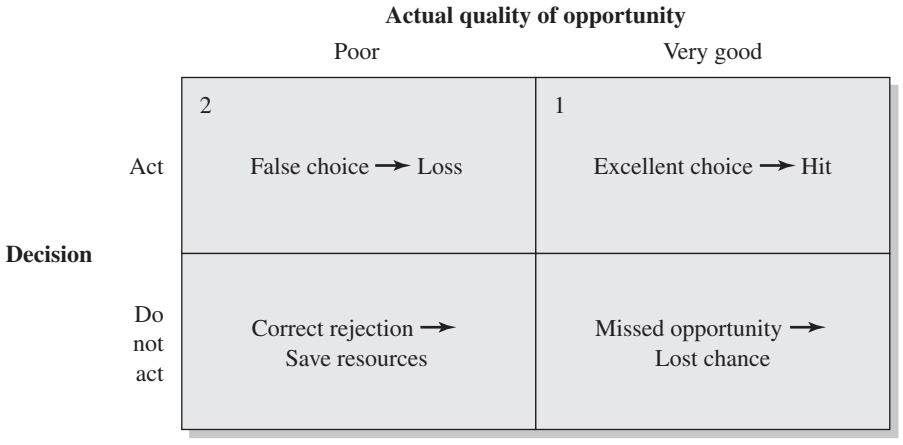


FIGURE 2.6 Decision matrix.

If one acts and it is a false choice, the cost of that choice is important. Opportunities that can be attempted with low initial financial and time commitment costs may offer the chance for lucrative returns at a low initial cost.

The matrix in Figure 2.6 shows the decision to act or not act. Then, the actual resulting quality of the opportunity is shown (this can be determined only after the decision). Life is about choices, and the best case is when we choose to act and it turns out we are right!

The entrepreneur attempts to make a rational decision based on (1) his or her current psychological and financial assets, and (2) the possible consequences of the choice [Hastie and Dawes, 2001]. The decision challenge is the task of turning incomplete knowledge of an opportunity into an action consistent with that knowledge. Competitive advantage comes from actually doing something that others cannot do. Analysis and reports cannot substitute for action. Reworking a plan is no substitute for acting to get things done. In the end, an opportunity can be evaluated only so much [Pfeffer and Sutton, 2000]. Ambiguity remains, and the entrepreneur needs to act on or reject the opportunity. Fear of failure may overwhelm all but the best opportunities.

Perhaps the best way to find a really good opportunity is to examine it by estimating fit in the diagram of Figure 2.4 and then act on the best opportunity, trying it out in the marketplace of ideas and investors. This can lead to a refinement of the opportunity. Tom Peters and Robert Waterman [1982] called this approach "ready, fire, aim". Banishing fear of failure and learning from a series of small failures can lead to a good new venture. The act-review-fix cycle, as shown in Figure 2.7, summarizes the critical ability to act, review, and learn from the results, and then, fix and adjust the business scheme as required. As John Stuart Mill stated: "There are many truths of which the full meaning cannot be realized until personal experience has brought it home."

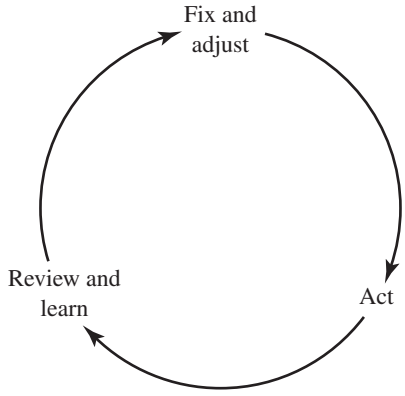


FIGURE 2.7 Act-learn-fix cycle of building a new venture.

2.4 The Concept Summary

Once a business opportunity has been selected for action, it is important to prepare a **concept summary** of the new venture. This can be a simple statement of the problem being addressed and how the venture will solve it. This statement of the business concept is a short description of the new business. The elements of a concept summary are given in Table 2.8. For example, the original business concept for Amazon.com might be summarized as "an Internet-based retail service that allows customers to search for and purchase at a discounted price books that will be delivered quickly."

A **story** is a narrative of factual or imagined events. The new business story depicts a business problem responded to with a new means to solve the problem. The story tells the goal of the venture, the challenge, and the response of the new firm. The creation of the story is used to communicate verbally the business idea and the profitable solution of the problem. The investor or new team member will be drawn to a good story. The three elements of a story summarized in Table 2.9 are (1) background, (2) challenge, and (3) resolution. The goal is to tell a compelling story in three acts: background and characters, challenge, and a workable resolution. All good stories exhibit coherence and flow. Coherence generates the listener's trust [Ibarra and Lineback, 2005]. By the end of the story, the reader or listener should know how the new venture will make a real difference to the customer [Kawasaki, 2004].

TABLE 2.8 Elements of a concept summary.

1.	Explain the problem or need and identify the customer.
2.	Explain the proposed solution and the uniqueness of the solution.
3.	Tell why the customer will pay for the solution.

TABLE 2.9 Elements of the business story.

1.	**Background:** Describe the current situation, characters, and problem.
2.	**Challenge:** Describe the challenges and conflicts that impede a coherent plan to solve the problem.
3.	**Resolution:** Portray a solution to the challenges and the problem and how the venture will succeed by resolving the problem.

As an illustration of an important story, consider the world's energy challenge. Energy is the lifeblood of industrial civilization and necessary for lifting the world's poor out of poverty. However, current methods of mobilizing energy are highly disruptive of local and global environmental conditions and processes. Thus, the challenge is to develop a new, more favorable energy system and its associated sources. The resolution of this challenge will, it is hoped, be the discovery of an energy technology that can economically convert solar energy to a locally useful form. One possibility is a solar conversion system yielding hydrogen to be used in fuel cells. Many technology ventures could exploit this opportunity favorably. It can become a great story with an important outcome.

In today's fast-paced, dynamic world, a business concept and associated story are all one needs to start working on building a business. For the first steps, the entrepreneur (1) builds a concept to solve the business challenge, (2) fashions a story that conveys the meaning of the new venture, and (3) prepares a presentation of a few slides that tell the story and explain the concept. The elements of a presentation are given in Table 2.10. After testing the concept summary and the story with potential investors and partners, the entrepreneur may go on to develop a complete business plan, which is a process described in Chapter 7.

The story can be told to all would-be investors or employees. The concept summary can be left with them for later review. The presentation is for more formal occasions with investors or allies. The story, concept summary, and presentation should be professional, novel, provocative, creative, and, where possible, customized. *Novelty* refers to newness and freshness. *Provocative* and *creative* mean it provokes interest and is creative in layout or format.

For many entrepreneurs, the executive summary of the business plan is what the investors and potential team members will want to review. If the entrepreneurs can piece together the initial elements of a business plan, they can write a reasonable summary without actually completing the plan. In a

TABLE 2.10 Elements of the presentation.

1.	Explain the concept and give the story. Emphasize the customers and their pain.
2.	Clearly explain the problem and the solution. Tell why the customer cares.
3.	Describe the competencies of the team. Tell about the passion and skills of the team.
4.	Provide a picture of the competition. Name a few competitors and tell how you are different and better.

TABLE 2.11 Elements of an executive summary.

1. Business concept: The problem and the solution
2. Market, customer, and industry
3. Marketing and sales strategy
4. Organization and key leaders
5. Financial plan: Four years of summary results
6. Financing and key allies required

sense, the executive summary is the essence of the business plan. As such, for many new ventures, it stands alone as a short business plan. The executive summary succeeds by capturing the readers' attention and imagination, causing them to want to learn more. When readers finish the executive summary, they should have a good sense of what the entrepreneurs are trying to do in their business. The executive summary should be no longer than three pages. Most professional investors will ask you to e-mail it to them. An executive summary states the problem, the solution, the customer, the competitive advantage, and who will lead the effort. This summary is intended to convey the core of the business and draw the reader into a follow-up conversation.

The executive summary portrays the content and purpose of your business. The elements of an executive summary are listed in Table 2.11. Not all these elements will be necessary for all ventures. A fictitious example is provided in Table 2.12. Also see appendix A for another executive summary. The executive summary for AgraQuest is provided in Table 2.13.

TABLE 2.12 Example of a business summary.

Security Robots Inc. (SRI) was formed in 2009 to design and build mobile robots for clearing and cleaning up facilities that have or may have experienced security breaches. Office buildings, factories, schools, and laboratories may be subject to intrusion by terrorists who plant biological, chemical, or explosive devices. The SRI robots are capable of remote operation by security and police organizations and can be used to examine and clear or destroy terrorists' weapons.

SRI is a Subchapter S corporation seeking an initial set of investors to bring its new products to market. Founded in 2009 by Dr. Henry Morgan and Ms. Angela Wolfe, the firm has designed a mobile robot platform that can be customized for many high danger security tasks. SRI has filed for a design patent on the robot platform system.

Dr. Morgan holds a MS in electrical engineering and a PhD in mechanical engineering from the University of Texas. Dr. Morgan served as chief technology officer of FMA Corporation of Dallas, Texas, from 1997–2008. Ms. Wolfe, CPA, holds an MBA from Duke University and was formerly CFO of Moore Systems, Austin, Texas.

SRI has secured 3000 sq. ft. of industrial space in Austin Technology Park. The current staff of six has an operating robot under review and certification by the U.S. Department of Homeland Security and the Texas State Police. Manufacture of the robot product line is to be provided by SelectTech Systems, a national contractor, at its Huntsville, Alabama, facility. The marketing plan calls for a regional strategy in the first year, 2010; with expansion throughout the southern and eastern United States in 2011. A highly trained direct sales force will sell the SRI robots to police and security organizations.

TABLE 2.12 (continued)

The funds requested for commencement of manufacturing and marketing operations are $400,000. The co-founders of the firm have already invested $120,000 of their funds. The funds will be used for facilities, equipment, contracting, and marketing communications. The founders will not receive a salary until January 1, 2011, or at cash-flow breakeven, whichever occurs first.

Financial projections show revenues of $1.3 million in 2010 and $7.4 million in 2011. The company intends to go public (IPO) within five years of beginning sales operations. Investors may purchase units of 10,000 shares for $20,000. After issuing the 200,000 shares to the investors for $400,000, there will be total of 2 million shares issued. All individual investors should contact the firm for an investment prospectus and further information.

Contacts:	Henry Morgan, CEO; Angela Wolfe, CFO	
	Security Robots Inc.	(512) 555-0121
	Austin Technology Park	www.securityrobots.net
	Austin, Texas 78712	

TABLE 2.13 AgraQuest executive summary.

Mission: AgraQuest's mission is to be the best and most efficient at discovery and development of environmentally friendly natural products for pest management.

The business: AgraQuest discovers, develops, and markets environmentally friendly natural product pesticides from microorganisms. It has three sources of revenues: (1) sales of natural product pesticides to farmers and consumers, (2) sales of lead molecules that do not fit our development criteria to large pesticide companies, and (3) contract testing for pesticide companies.

Market need and market opportunity: 25 billion dollars are spent each year on chemical pesticides. Consumers have increasing expectations that their food is free of pesticide residues. Society has increasing concerns about how chemicals affect the environment, including fish, wildlife, groundwater, and air quality. The regulatory agencies are responding by establishing stricter criteria for registration of new chemical pesticide products and reregistration of older ones. The cost and time for registering a new chemical pesticide have ballooned to $40–70 million and 7–10 years. As a result, few new products are being registered, and many older products are being taken off the market or are so tightly regulated that their use is limited.

Technology: Natural products are substances produced by microbes, plants, and other organisms that can kill pests. Unlike natural products, currently marketed biopesticides, such as *Bacillus thuringiensis* (Bt), insect viruses, and insect-killing fungi, use living organisms as pesticides. As a result, they are negatively affected by heat, wind, rain, and sunlight. Therefore, they do not have efficacy as good as chemical pesticides and have not significantly penetrated chemical pesticide markets. Natural products can have efficacy against the targeted pest that is as good as chemical pesticides. This is not speculation. We have found them. We know they are there. Unlike many chemical pesticides, natural products are biodegradable and specific to the pest, without harmful effects on fish, wildlife, and beneficial insects.

Microbial natural products can be registered with the U.S. Environmental Protection Agency (EPA) as "biochemicals." This means that bringing a specific natural product to the market takes considerably less time and money (approximately 3–5 years and less than $5 million) than chemical pesticides.

Competition: If microbial natural product pesticides are so ideal, why aren't they the target of large companies? Pharmaceutical companies have the technical expertise for discovery of microbial natural products with pesticidal activity, but they are often not set up to assess agricultural applications of the molecules and lack the knowledge and experience to commercialize them. There is currently no independent company dedicated to screening for microbial natural product insecticides, fungicides, nematicides, and herbicides.

(concluded on next page)

TABLE 2.13 (continued)

Company's competitive advantage: AgraQuest can find a higher number of novel pesticidal natural products more quickly than anyone else. We have unique knowledge of the groups and sources of microorganisms that yield the highest number of novel pesticidal natural products. Our proprietary isolation and fermentation media generate higher numbers of "hits." We find more novel natural products because of our focus on difficult chemistry that very few in the industry attempt. We have proprietary automated, high-throughput in-vivo and in-vitro pesticidal and extraction assays. At a very early stage, we can rapidly recognize pesticidal molecules with product potential and activity as good as synthetic chemicals. We know how to develop and market bio-based pesticides in specialty markets; we have extensive and unique knowledge of the market and competition. We are experienced at creating a company culture that results in exceptional and sustained productivity, creativity, motivation, and commitment by employees.

Management team: AgraQuest has assembled a management team experienced in pesticide, biopesticide, and agricultural biotechnology business, research and development, marketing, management, and finance.

Pamela G. Marrone, PhD, President/CEO. Dr. Marrone left Novo Nordisk in January 1995 to start up AgraQuest. Under her tenure as president of Novo's subsidiary, Entotech, Inc., which she built from the ground up, the company extended its Bt product line into three new crop segments, brought a Bt product, two new Bt product formulations, and a new gypsy moth virus product formulation to the market. In addition, Entotech found six novel pesticidal natural products, including a novel Bt enhancer (now on the commercial track), and has filed or has pending 20 patent applications. Dr. Marrone wrote and implemented marketing plans and developed a new approach to generating revenue from biopesticides, which is now the flagship strategy of the division. Prior to Novo Nordisk, Dr. Marrone worked for Monsanto Agricultural Company (1983–1990). Her Insect Biology group led pioneering projects in natural product and genetically engineered microbial pesticides and Bt transgenic crops (to be on the market in 1996).

Ralph Sinibaldi, Vice President of Research and Development. Dr. Sinibaldi worked for Sandoz Agro, Inc., from 1982 to 1994 and was most recently Associate Research Director and Project Manager, where he coordinated two major products on crop transformation and regulation of gene expression. Dr. Sinibaldi has received or filed several patents, and he turned over three major pieces of technology to Sandoz Seeds for development.

Duane Ewing, Vice President of New Business and Product Development. Duane Ewing has 13 years of management experience and a total of 17 years of experience in agriculture-related industries. As one of the first employees of Pan-Ag Labs, Inc. (1981), Mr. Ewing played a crucial role in Pan-Ag's growth from $120,000 to almost $6 million annually in roles as Director of Field Research, Director of Business Development, Vice President, and de facto President during the owner's absence.

Bruce Holm CPA, Chief Financial Officer. Bruce Holm has over 30 years of accounting experience. For 16 years (1971–1987), he was Corporate Controller for Zoecon Corporation, where he was responsible for financial reporting in six SEC filings. Following Zoecon (1987–1991), he was employed by California Energy Company, Inc., as Corporate Controller and Joint Venture Controller.

Financial summary and amount and structure of proposed financing: AgraQuest requires start-up funding in the first full year of approximately $1.1 million for equipment, $2.5 million for operations, and $2.9 million for cash reserves. *First-round financing of $2.5 million will allow us to identify our first commercial product candidate from our own R and D and to develop an externally acquired product*. The following two years are expected to require approximately $11.4 million for operating expenses, $5.8 million funded by sales of research

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TABLE 2.13 (concluded)

services and molecules and product sales, leaving a net operations requirement of $5.1 million. Also, approximately $1.1 million is projected for equipment and improvements purchases, and $0.8 million is required for cash reserves.

A public offering is projected to occur early in year five, with a target of $20 million. We are confident that AgraQuest can, by year three, develop a pipeline that subsequently generates 5–10 new natural products per year. Our novel natural product portfolio will specifically include two for corn rootworm (to be sold), one for sucking insects, one fungicide, one nematicide, and one herbicide (to be sold).

The business projects a profit in year five and approximately $40 million in sales of molecules, services, and products in year seven.

Projected capital requirements:	($thousands)			
Year ended June 30:	1996	1997	1998	1999
Operating expenditures and interest	$2,500	$4,700	$6,700	$9,800
Equipment and furniture	1,100	500	600	400
Cash reserves buildup	2,900		1,300	
Total	$6,500	$5,200	$8,600	$10,200
Projected funding:				
Revenue from contract screening, molecule and product sales, and government grants	$200	$1,800	$4,000	$7,500
Equity financing	5,200	2,600	4,300	
Capital lease and/or bank financing of equipment, net of repayment	1,100	300	300	
Cash reserves usage		500		2,700
Total	$6,500	$5,200	$8,600	$10,200

Status of the company: AgraQuest was incorporated in the state of Delaware in January 1995. The company is in the process of completing seed financing (approximately $200,000), which is being used for starting the microbial library and pest colonies. Also, we expect to obtain one product candidate from outside the company and secure at least one corporate collaboration.

2.5 AgraQuest

Pam Marrone and her colleagues at Entotech were informed by Novo Nordisk that the firm was being sold to Abbott Laboratories. Marrone believed that natural biological controls could protect crops—an old idea that environmental enterprises are making fresh again. Driving the quest is pressure from government and consumer activists to reduce the use of synthetic chemicals on the nation's farms and ranches. The challenge for such companies is to develop reliable biopesticides at a price with chemicals.

Marrone contemplated leaving Entotech and starting a new venture based on developing an innovation (item 8 of Table 2.1) in the biotechnology industry: finding naturally occurring microorganisms that can serve as biopesticides and developing a process for producing them for reliable use on farms. With the

growing trend toward natural, environmentally friendly products and processes, the opportunity looked favorable.

Marrone had already worked in corporate new ventures with Monsanto and Novo Nordisk, and she was confident of her technical and leadership competencies. She examined the opportunity using the principles of Table 2.6 and determined that this opportunity was very good. The agricultural pesticide industry showed a tendency to be slow to adopt risky innovations such as natural pesticides. However, she was convinced she could overcome the risk-averse nature of the farmer and the long regulatory review by government. The fit of her proposed company (see Figure 2.4) with the opportunity seemed to be high. Therefore, she decided to act by finding the key members of her team and founding the company, to be called AgraQuest. She was convinced that the opportunity was of very high quality (see Figure 2.6).

Pam Marrone and her fellow founders wrote an executive summary dated May 5, 1995, provided in edited form in Table 2.13.

2.6 Summary

The entrepreneur identifies numerous ideas and needs that may point to good opportunities that can be made into great companies. However, he or she searches for the one that best fits the capabilities of the team, the characteristics of the business context, the characteristics of the opportunity, and the team's capability to secure the necessary resources. Then, the entrepreneur decides whether to act or not act on that best-fit opportunity.

The important ideas of the chapter are:

- A great enterprise displays leadership in its industry, profitability, reputation, and longevity.
- Great opportunities are often disguised as problems that are difficult to describe.
- An important problem well stated is a problem on its way to solution.
- The entrepreneurial team should cumulatively possess all the necessary capabilities.
- Entrepreneurs should, if possible, act on favorable opportunities in a timely manner.
- Entrepreneurs should prepare a story and summary of the venture and use it to test the venture with potential customers, employees, and investors.

Principle 2
The capable entrepreneur knows how to identify, select, describe, and communicate an opportunity that has good potential to become a successful venture.

Video Resources

Visit http://techventures.stanford.edu to view experts discussing content from this chapter.

Disruptive Technologies	John Doerr	KPCB
Find a Wave and Ride It	Erik Straser	MDV
Problem-Solving Paradigm	Vinod Khosla	Khosla Ventures
The Founding of AgraQuest	Pam Marrone	AgraQuest

2.7 Exercises

2.1 One approach to classifying market entry is by (a) creating a new market, (b) attacking an existing market, or (c) resegmenting an existing market. Using Table 2.1, indicate how each of these categories of opportunities would be applicable to these market-entry approaches.

2.2 What were some of the key customer, technology, and market trends that drove entrepreneurship during the last decade? What factors do you predict will drive entrepreneurial challenges in the next decade?

2.3 The next big wave of innovation may be the convergence of bio-, info-, and nanotechnologies. Each holds promise in its own right, but together in combination, they could give rise to many important products. Describe one opportunity motivated by the convergence of these new areas, and develop a story about the opportunity.

2.4 Some imagine that within a few years it will be possible, through the use of stem cells, to create new cells and eventually new organs to replace those that fail. Summarize the potential opportunity for stem cell enterprises. How would you begin to estimate the size of this opportunity? Develop a story depicting the opportunity.

2.5 The convergence of biology with computers and nanotechnology may lead to safer and more effective medicines. Visit www.research.cornell.edu/anmt and examine the potential for nanomedical technologies. Write a brief concept summary for a nanotechnology start-up.

2.6 As energy costs rise and the impact on the environment becomes clearer, clean tech has become an area of significant new investment. Quantify the trends driving this renewed investment interest. How would you evaluate and market size the clean tech opportunity?

2.7 Great companies often create tools that solve people's everyday problems. People like to chat and say hello often. What innovations were motivated by this simple desire? What new opportunities in this space are being created by technology innovation?

2.8 Consider a software application you use regularly. What task(s) does it improve or enable? Suggest three ways the application could be improved. Would any of these improvements be considered an opportunity for a new venture? Why or why not?

2.9 Global sales of radio frequency identification tags (RFID) and related equipment have been forecasted to explode multiple times in the last decade. Describe the problems solved by RFID and the opportunities presented. What have been the barriers to commercialization of this technology? What types of opportunities will be created when RFID tags are widely adopted in products?

2.10 The trend of performance of two electronic technologies is given in Figure 2.8. Determine the performance trend of another technology. Prepare a chart of its performance over time.

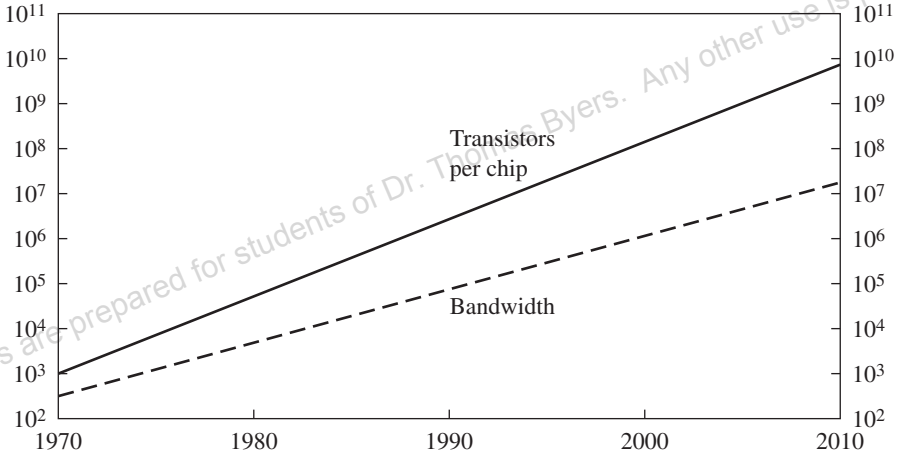


FIGURE 2.8 Technology trends: (a) transistors per chip; (b) bandwidth per household (bits/second). (*Source:* Dorf, 2004.)

VENTURE CHALLENGE

Consider the opportunity that you identified at the end of Chapter 1.

1. Evaluate it using Table 2.6's principles and Table 2.7's process. Write a concept summary using the format provided in Table 2.8.

2. Create a brief business story for the opportunity (venture) as summarized in Table 2.9 and present it to your team. Be sure to clearly describe the product or service, what problem it is solving, and who the customer is.

CHAPTER 3

Vision and the Business Model

Success in any enterprise requires the right product, methods, and workers, and each must complement the others.
Joseph Burger

CHAPTER OUTLINE

How do successful entrepreneurs create a compelling business design for their new ventures?

A new business is defined by the wants or needs customers satisfy when they buy a product or service. To create a theory of a new business, the entrepreneur must cogently and clearly describe the customers and their needs and how the new venture will satisfy those needs. To describe the business, the entrepreneur prepares a series of statements and propositions that clearly outline the business. These are ultimately summarized in a model of the business activities and goals. Based on the core competencies of the organization coupled with the business model and the key resources available, the firm acts to attempt to create and retain a sustainable competitive advantage. The six steps of designing and creating a theory of the new business are summarized in Figure 3.1. ■

3.1 The Vision

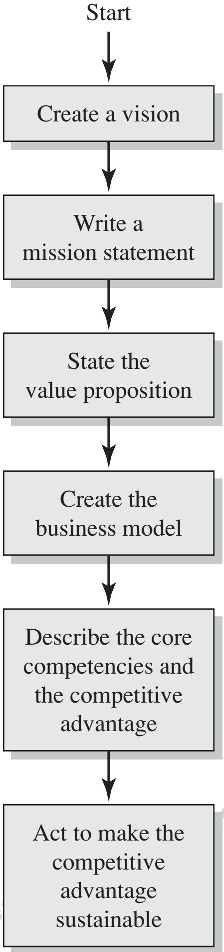


FIGURE 3.1
Creating a business theory of a new venture.

Once the entrepreneur identifies a good opportunity and decides to pursue it, the next step is to formulate a vision. A **vision** is an informed and forward-looking statement of purpose that defines the long-term destiny of the firm. Thus, if the entrepreneur recognizes a good opportunity to meet a real customer need, he or she describes a vision of a future venture that will respond effectively to that opportunity. The vision is a statement of insight, intention, ambition, and purpose. It reflects clearly the novelty of the solution and uniqueness of the entrepreneur's commitment. Successful entrepreneurs are able to communicate their vision and their enthusiasm about that vision to others. A vision often constitutes a novel idea about serving its market. McDonald's vision is: low-priced, fast food in a clean restaurant for people short on time. Google's vision is: online search that reliably provides fast and relevant results.

A solid vision provides direction and shows a path forward. A vision also motivates and influences decisions that are made by the team members. A clear vision can bind and inspire the entire community of a firm. A good vision is clear, consistent, unique, and purposeful [Hoover, 2001]. A clear vision is also easily understood. A consistent vision is one that does not change in response to daily challenges and fads. Any sound vision clearly explains the purpose of the firm. Remember, a good opportunity embodies a response to a big problem and calls forth a clear picture of your response. The 7 elements of a vision are summarized in Table 3.1.

Any business must understand what outcome the customer will really pay for. For example, doctors and their patients seek biomedical devices that really improve the lives of the patient. Therefore, a stent placed in an artery should keep the artery open. For Southwest Airlines, passengers want low prices, on-time arrivals, and the ability to fly between a chosen pair of cities [Chatterjee, 2005].

The purpose of the firm defines the enduring character of the organization, consistently held to and understood through the life of the firm. The purpose, or core ideology, of Hewlett-Packard has been a respect for the individual, a dedication to innovation, and a commitment to service to society. The purpose of Merck is to gain victory against disease and help mankind. This core ideology provides the glue that holds an organization together [Collins and Porras, 1996]. The vision provides a clear picture of the future for all concerned.

TABLE 3.1 Elements of a vision.

- **Clarity:** Easily understood and focused
- **Consistency:** Holds constant over a time period, but is adjustable as conditions warrant
- **Uniqueness:** Special to this enterprise
- **Purposeful:** Provides reason for being and others to care

TABLE 3.2 Example of a vision for an innovative firm.

We strive to preserve and improve people's lives through the innovation of biomedical devices while supporting, training, and inspiring our employees so that individual ability and creativity are released and rewarded. Our goal is to be the leader in our industry by 2012 and be widely known throughout the world for devices that save and extend lives.

The core ideology is based on the core values of the organization, such as respect for the individual.

A vision describes a specific desired outcome and promotes action and change. It serves as a picture of its destiny as the firm moves through challenge and change. It also provides the basis for a strategy. A vision is an imaginable picture of the future. It is like a rudder on a boat in a turbulent sea. An example of a simple, clear vision is given in Table 3.2. This vision statement provides the reader with a clear mental model of where the firm is going and how it will get there. Notice that the vision statement of Table 3.2 states the values and goals of the firm, and it inspires and motivates people.

Entrepreneurs need to create a shared vision or meaning for their venture. A dialogue of meaning and commitment will help bring a shared sense of urgency and importance for the venture. The vision can be written as a statement and verbally expressed as a story. The vision is used as a part of the business plan and described often to potential team members and investors. Stories play an important role in the processes that enable new businesses to emerge. A story is a narrative version of the vision, told in an engaging way. It helps to make the unfamiliar new enterprise more familiar, understandable, acceptable, and thus more legitimate to key constituencies [Lounsbury and Glynn, 2001]. By clarifying the core idea behind an enterprise, a story can also help an enterprise raise money and gather other resources [Martens et al., 2007].

Jim Clark started three companies: Silicon Graphics, Netscape, and Healtheon (now WebMD). As recounted in *The New New Thing* [Lewis, 2000], Clark stated:

> "The only thing I can do is start 'em." His role in the Valley was suddenly clear: he was the author of the story. He was the man with the nerve to invent the tale in which all the characters—the engineers, the VCs, the managers, the bankers—agreed to play the role he assigned them. And if he was going to retain the privilege of telling the stories, he had to make sure the stories had happy endings.

Clark had a vision for eliminating waste in the $300 billion costs of the U.S. health system by using the Internet to enable all the parties of any health transaction to connect via an online network—no paper forms, no hassle. Clark sketched a diamond depicting the players, as shown in Figure 3.2, and placed his proposed company, Healtheon, in the middle as intermediary. This was the way Clark told his ambitious stories—graphically, using sketches. Tales told by the entrepreneur aim to show plausibility and build confidence that the enterprise can

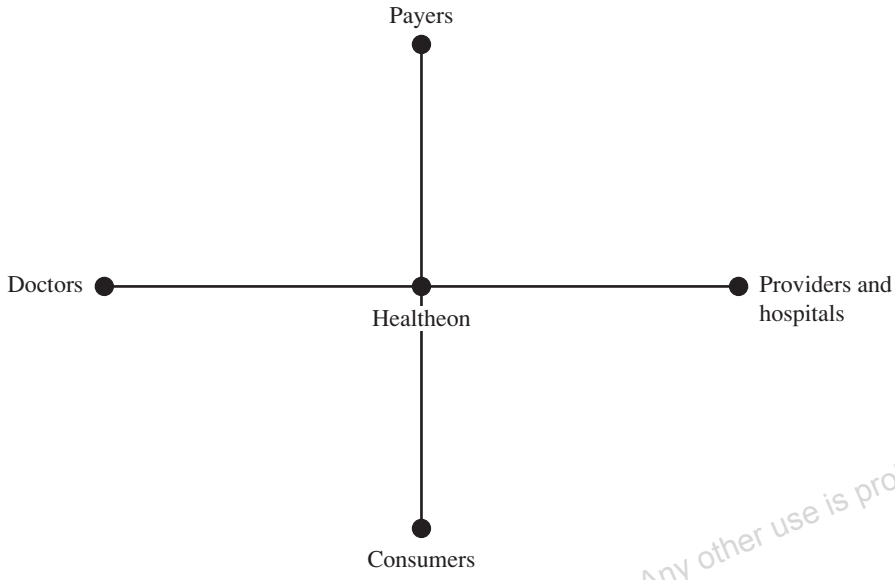


FIGURE 3.2 Vision for Healtheon (now WebMD). WebMD's three main businesses are providing electronic transaction services to doctors and hospitals, marketing software to help doctors run their practices, and providing online health information to doctors and consumers (see www.webMD.com).

succeed. To construct an identity that legitimates a new venture, entrepreneurial stories must have narrative clarity and resonate with the expectations, interests, and agendas of potential stakeholders [Lounsbury and Glynn, 2001].

Entrepreneurs need to learn how to tell their story about their team and venture, and to explain how their products will solve a problem. Their vision of the future can capture the interest of investors and team members.

Vinod Khosla is a prominent investor in green (clean) technologies. He believes that lifestyle changes and more conventional technology like hybrids will not be sufficient to solve the world's climate change crisis. According to Khosla, anything requiring people to spend more money or change their habits has a low probability of success. He is investing in revolutionary technology like cellulosic biofuels, which could fundamentally change the game by producing oil cheaper than any company today. In his view, any solution must make a difference at scale and cost less than conventional alternatives. This would drive people toward climate-friendly solutions for market reasons rather than ideological ones.

A vision told as a story helps people to see the situation and visualize the solution. The vision can also help people respond to the emotionally charged idea and want to help bring about useful change to the situation. The vision can be told as a story describing the potential outcome.

Henry Ford had a vision in 1910 of an automobile that could be available to all [Hounshell, 1985]:

> [The] greatest need today is a light, low-priced car with an up-to-date engine of ample horsepower, and built of the very best material. . . . It must be powerful enough for American roads and capable of carrying its passengers anywhere that a horse-drawn vehicle will go without the driver being afraid of ruining his car.

3.2 The Mission Statement

The mission statement for a new venture will more completely describe the company's goals and customers, while incorporating the basic tenets of the vision statement. A vision is an imaginative picture of the future, while a mission is a description of the course of action to implement the vision. The mission of an organization is lofty and audacious. It provides for a theory of change.

The potential elements of a mission statement are shown in Table 3.3. Most mission statements include only some of these elements. For example, the mission statement of eBay is given in Table 3.4.

Most mission statements are short—fewer than 100 words. The mission statement should be a concise, clear explanation of the purpose, values, product, and customer. The eBay statement clearly describes its mission. An example of a concise yet clear mission statement for an electronics firm is: "Our mission is to design and manufacture electronic devices that serve the needs of the aerospace industry on a timely basis and at reasonable prices."

A good mission statement can help align all the stakeholders and provide a rationale for allocating resources. If possible, the mission statement should be developed by the entrepreneurial team with other employees. The mission

TABLE 3.3 Possible elements of a mission statement.

■ Core values	■ Competitive advantage
■ Customers and/or stakeholders	■ Values provided to customer
■ Products	■ Markets or industry

TABLE 3.4 Mission statement of eBay.

We help people trade practically anything on earth. eBay was founded with the belief that people are basically good. We believe that each of our customers, whether a buyer or a seller, is an individual who deserves to be treated with respect.

We will continue to enhance the online trading experiences of all—collectors, hobbyists, dealers, small business, unique item seekers, bargain hunters, opportunistic sellers, and browsers. The growth of the eBay community comes from meeting and exceeding the expectations of these special people.

Our mission is to be the leading biotechnology company. using human genetic information to discover, develop, manufacture, and commercialize biotherapeutics that address significant unmet medical needs. We commit ourselves to high standards of integrity in contributing to the best interests of patients, the medical profession, our employees, and our communities, and to seeking significant returns to our stockholders, based on the continual pursuit of scientific and operational excellence.

FIGURE 3.3 Genentech mission statement.

TABLE 3.5 Mission statement of Symantec Corporation.

At Symantec, we know what happens when people have the confidence to achieve their best; we help make it possible. We're the global leader in Internet security—solely dedicated to making the connected world a safer place. The more connected the world becomes, the more pivotal our role in making it an environment where commerce, culture, and ideas can flourish. Symantec breeds confidence.

statement for Genentech is shown in Figure 3.3. This statement is very complete and describes its commitment to all its stakeholders—customers, employees, and community. The mission statement of Symantec Corporation is provided in Table 3.5. This statement speaks clearly to the customers—Symantec breeds confidence.

3.3 The Value Proposition

Value delivered to the customer results in a satisfied customer who will pay a reasonable price in return for the product or service. **Value** is the worth, importance, or usefulness to the customer. In business terms, value is the worth in monetary terms of the social and economic benefits a customer receives from paying for a product or service. To be successful, firms must offer products that meet the needs and values of the customer. The needs of the customer often include ease of locating or accessing the product as well as its qualities and features.

The five key values held by a customer can be summarized as product, price, access, service, and experience. These five values are listed in Table 3.6, along with specific descriptors for each value. Price, for example, can have high value to the customer when it is fair, visible, and consistent. A product may have value if it has high performance and quality, and is easy to find and use. Most technology-based products are initially focused on performance and functionality [Markides and Geroski, 2005].

TABLE 3.6 Five values offered to a customer.

1.	**Product:**	Performance, quality, features, brand, selection, search, easy to use, safe
2.	**Price:**	Fair, visible, consistent, reasonable
3.	**Access:**	Convenient, location, nearby, at-hand, easy to find, in a reasonable time
4.	**Service:**	Ordering, delivery, return, check-out
5.	**Experience:**	Emotional, respect, ambiance, fun, intimacy, relationships, community

The value proposition defines the company to the customer. Most value propositions can be described using the five key values. Crawford and Matthews have shown that one value is selected to dominate the value proposition offered to the customer. A second value differentiates the offering, and the remaining three values must meet the industry norm [Crawford and Matthews, 2001]. Consider a performance rating on a 1-to-5 scale where 5 is world-class, 1 is unacceptable, and 3 is industry par. Crawford states that a venture should plan a good product offering to have a value score of 5, 4, 3, 3, 3 for its five value proposition attributes in the following order: dominant, differentiating, norm, norm, norm.

Consider Wal-Mart, where price is the dominant value of its offering. Wal-Mart differentiates itself on product in terms of selection and quality. By contrast, the values offered by Target are dominated by product and differentiated by price. Many firms focus on good service, which is about human interaction. For example, Honda has great service as its dominant value, and its secondary, differentiating value is product.

Access can be described by ease of locating, connecting to, and then navigating the physical or virtual facility of a business. Very good accessibility is offered by Amazon.com, and its website is relatively easy to navigate. Accessibility can also be described as convenience or expedience. For a customer with a high demand for time, convenience is very important. A readily accessible website can be very valuable to a time-starved customer.

Zappos.com sells shoes and other clothing and accessories through its website. The company is known for providing an excellent customer experience. According to Zappos, "Customer service isn't just a department, it is the entire company." As a result, the company has a 75 percent repeat business rate, and enjoys a very good reputation through word-of-mouth referrals.

Apple Computer realized that by opening retail stores, it could make buying its products more of a recreational experience. Apple Stores provide a place to gather casually and learn how to do interesting things with Apple products. Customers can do everything from buying a computer or phone to learning how to record their own music and interacting with other Apple aficionados. As important, these extra services that Apple Stores provide are complimentary to all customers.

Most customers seek a provider of a product or service who saves them time, charges a reasonable price, makes it easy to find exactly what they want, delivers where they ask, pays attention to them, lets them shop when they want to, and

TABLE 3.7 Primary and secondary values for leading firms.

		Primary Value				
		Product	**Price**	**Access**	**Service**	**Experience**
Secondary Value	**Product**	——	Wal-Mart	Amazon.com	Honda	Harley-Davidson Disney World
	Price	Target	——	Holiday Inn	Wal-Mart	Olive Garden
	Access	Google Barnes & Noble	Priceline Visa	——	Dell Computer	Starbucks
	Service	Toyota Home Depot Intel	Southwest Airlines	McDonald's	——	Carnival Cruise Line
	Experience	Mercedes	Virgin Atlantic Best Buy	AT&T	Nordstrom	——

makes it a pleasurable experience. Any firm that fashions a value proposition to that set of customer values and actually delivers on that promise should do well.

The product value is described by its performance, range of selection, ability to search for it, and quality. Volvo built its business on the idea of product safety. Volvo became the first car company to offer three-point, lap and shoulder seat belts. Home Depot focuses on providing a very wide selection of quality products. The differentiating (secondary) value for Home Depot is its service. The primary and secondary values for selected leading firms are shown in Table 3.7.

One value of product is range of selection or choice. Often to appeal to many different customers, a firm offers many versions of a product. However, too much choice is often debilitating [Schwartz, 2004]. If a firm offers extensive choice, it should help the customer search and select the right version. Amazon and TiVo offer such help to their customers.

Remember, a firm must meet at par the three remaining variables. Consider the plight of today's department stores. Their primary value is product selection. However, they are struggling to be accessible to today's shopper and just be at par on service, price, and experience.

Google's Value Proposition

What are the primary and secondary values for Google? It offers product as its primary value with fast, relevant results for the most ill-described inquiry. Its secondary value is access, which is embodied in the easy online connection right to the search page without annoying pages or advertisements obscuring the search box.

The **value proposition** states who the customer is and describes the values offered to this customer. The value proposition for Amazon.com could be described as:

> An easily accessible Internet site that is convenient all of the time to provide a wide selection of books, CDs, and videos at a fair price to the busy, computer-literate customer.

The value proposition for Starbucks could be described as:

> We provide a friendly, comfortable, well-located place offering a wide range of fresh, customized quality coffees, teas, and other beverages for the person who enjoys a good experience and a good beverage.

Home Depot and Lowe's stores are the two large home-improvement chains in the United States. Home Depot's dominant value is product selection, and its secondary value is service. Lowe's has a dominant value of accessibility and a secondary value of product selection. These value differences lead to clearly separate value propositions offered to the customers of these two competitors.

The **unique selling proposition** (USP) is a short version of a firm's value proposition and is often used as a slogan or summary phrase to explain the key benefits of the firm's offering versus that of a key competitor. For example, Hewlett-Packard uses a USP as follows:

> Excellent technical products with reliable service at a fair price.

The clear, simple USP for FedEx is:

> Positively, absolutely overnight.

USPs are useful for succinctly describing a new venture to would-be investors, customers, or team members. In the jargon of investors, it is often called "the elevator pitch." This is a short description of your venture that can be told during the brief ride on an elevator between getting on and getting off. The USP is widely used in Hollywood for screenwriters to "pitch" their movie idea in a single sentence. For example, the pitch for *Spiderman* is "After a chance encounter with a spider in a chemical lab, a teenage boy realizes that he has super powers that he must use to save the city and win the girl he loves."

New ventures can use their value proposition and unique selling proposition to clarify the business values offered to the customer. This will help all stakeholders understand the purpose of the firm's business concept.

3.4 The Business Model

The design of a business is the means for delivering value to customers and earning a profit from that activity. The **business design** incorporates the selection of customers, its offerings, the tasks it will do itself and those it will outsource, and how it will capture profits. Business design is often called business concept. A successful business design represents a better way than existing alternatives.

TABLE 3.8 Elements of a business model.

■ **Customer selection:**	Who is the customer? Is our offering relevant to this customer?
■ **Value proposition:**	What are the unique benefits?
■ **Differentiation and control:**	How do we protect our cash flow and relationships? Do we have a sustainable competitive advantage?
■ **Scope of product and activities:**	What is the scope of our product activities? What activities do we do, and what do we outsource?
■ **Organizational design:**	What is the organizational architecture of the firm?
■ **Value capture for profit:**	How does the firm capture some of the total value for profit? How does the firm protect this profitability?
■ **Value for talent:**	Why will good people choose to work here? How will we leverage their talent?

It is like writing a news story, which will be used to attract investors, customers, and team members. In other words, the business design itself is an opportunity to be innovative [Zott and Amit, 2007].

A good business design involves what your firm will and will not do and how the firm will create a sound value proposition. The business design answers three key questions: who is the customer, how are the needs of the customer satisfied, and how are the profits captured and profitability protected. The resulting outcome of the business design process is the **business model,** which is the description of the business and how it will work in economic terms. A business model is a set of planned assumptions about how a firm will create value for all its stakeholders [Magretta, 2002]. A business model is the framework that connects a technology to economic profits.

The business model answers questions about the customer, profit, and value. The elements of a business model are shown in Table 3.8. The business model for Dell Computer is given in Table 3.9 [Slywotzky, 2000]. The first critical element of a business model is the selection of the customer. The business design

TABLE 3.9 Dell Computer business model.

■ Customer selection: High relevance	Four segments: Corporate, government, education, consumer
■ Value proposition: Unique benefits	A customized computer at a good price with great service readily accessible via phone or Internet
■ Differentiation and control: Sustainable competitive advantage	Customized products via a direct sales channel via phone or Internet with strong service and customer relationships
■ Scope of product and activities	Desktops, laptops, and servers Strong supply-chain management
■ Organizational design	Divisional organization for each customer segment
■ Value capture for profit	Opportunities for cross-sell and up-sell. Avoid price as the key value and focus on service and accessibility.
■ Value for talent: Learn, grow, prosper	Training, learning, and career opportunities

aims to specify the customers with unmet or latent needs, which will then define the target market. Dell uses four market segments to describe its customers and then prepares separate offerings for each segment. It is important to choose customers who will permit you to profit and spurn customers who want great value but are difficult or unfairly demanding. Instead of making all customers very happy, focus on the right customer and create an offering that allows good value to the customer and a reasonable profit to your firm. If possible, the price of your offering should include a reasonable profit margin, as well as good value for the customer. Once you know who your selected customer is, start saying no to those who don't fit the model.

The second step is to clearly state a unique value proposition that will provide differentiation for your firm. Show how the value proposition will address the market segment you have identified. For example, Dell sells customized computers at a good price with great service. Dell differentiates itself by relying on a direct sales model via the phone, mail, or the Internet and providing offerings suitable for each separate market segment.

Next, explain the scope of product and activities and organizational design that will enable you to implement the value proposition. A clear path to profitability is critical. You should determine your company's actual and projected revenues and expenses, identifying the key factors that influence total revenues and costs. Then, plot cash flow versus time to determine your financing needs [Hamermesh et al., 2002]. More on this process is detailed in Chapter 17.

Furthermore, it is important that you can retain good profit margins so that you can invest for the future. In general, it is best to avoid competing solely on price and making price the dominant value of the value proposition. Those companies that do make price the dominant value, such as Wal-Mart, Costco, Dollar General, and Family Dollar, are careful to differentiate themselves along other dimensions, too. Dollar General and Family Dollar use smaller stores in well-located strip malls so that accessibility is their differentiating value. Wal-Mart and Costco compete on the product quality and selection as their secondary value. The business model of Wal-Mart is successful because of its use of technology to achieve strong supply-chain management and store inventory control.

Southwest Airlines is another example of a business with price as the dominant value in its value proposition. Its secondary value is service: on-time arrival and departure, online ticket ordering, and a customer-friendly attitude. It captures profit from the valued service by controlling costs. It uses one type of aircraft, which keeps its costs of maintenance and training lower than its competitors'. It also heavily promotes the online sales of tickets. As a result, Southwest has been profitable every year since 1973 [Freiberg and Freiberg, 1997]. The business model of Southwest Airlines is compared with the business model of American Airlines in Table 3.10.

Customers influence changes in sound business models as their priorities change. Many business models fit a context that eventually evolves and necessitates changes in the models. The obsolescence of an outmoded

TABLE 3.10 Business model of two airlines.

	American Airlines	Southwest Airlines
Customer	Traveler who needs to fly many places throughout the world	Traveler who desires to fly routes served point to point in the U.S.
Value proposition: Dominant value Differentiating value	 Product Accessibility	 Price Service
Differentiation	Wide scope of product: goes almost anywhere	Limited point-to-point flights Easy maintenance and training for low cost
Scope of products and activities	Very broad: connects everywhere	Narrow: only flies to selected cities (point to point)
Organizational design and implementation	Hub-and-spoke High fixed cost	Point-to-point Lower, flexible costs Control costs
Value capture for profit	Dominate hub city Requires high occupancy	Requires high occupancy
Value for talent	High pilot salaries Good career	Participation in stock options and camaraderie

business model and the necessity for a redesign of the business model is called value migration [Slywotzky, 1996]. For example, the appropriate business model for Hewlett-Packard Corporation has changed significantly since the company's founding in 1938. In recent years, many of the firm's manufacturing activities have been outsourced as the company migrated toward a computer company competing on the primary value of product and the secondary value of price.

The business design process is summarized in Figure 3.4. The dynamic firm continuously tests for changing conditions and redesigns its value proposition to meet the values of its customers.

Almost every aspiring entrepreneur assumes that his or her first business plan (plan A) will be successful. What should an entrepreneur do when it falters or investors are not attracted? Determining what projected customers will actually pay for is difficult. A few focus groups and surveys is a start, but will likely come up short of what is needed. Good entrepreneurial teams try plan A on customers, but then are ready to adjust and move to plan B. They test hypotheses against reality and then are ready to adjust plans.

One solid approach is to use a dashboard to track key information for the team and key investors. The results (numbers) displayed on the dashboard give key indicators, which can be shown to the rest of your team and investors. The key elements of your business are described in the business model as shown in Table 3.8. In most cases, investors will want quantitative evidence of the soundness of this business model [Mullins and Komisar, 2009].

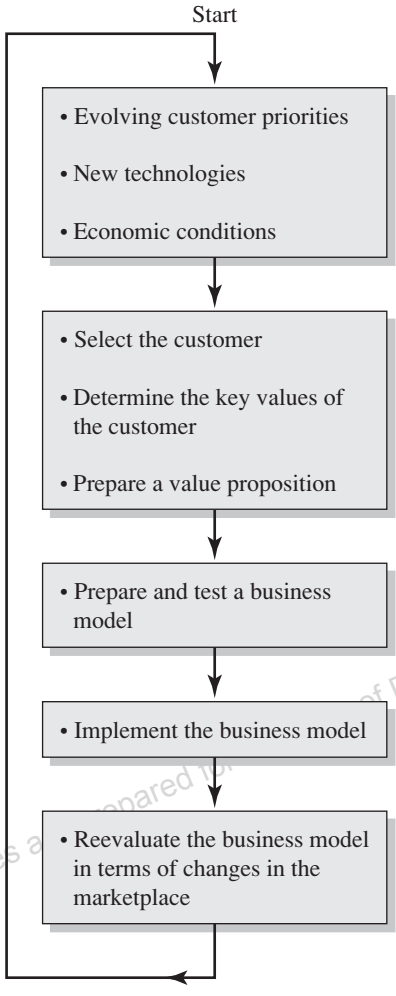


FIGURE 3.4 Business design process.

3.5 Business Model Innovation in Challenging Markets

The collapse of stability in the marketplace challenges any business team to keep its place in the list of successful companies. Business model innovation is the capacity to reconceive existing business models in new ways that create new value for customers [Hamel, 2000]. For example, Hewlett-Packard changed its model to become America's premier brand for computer printers. The key to Hewlett-Packard's business model is the consistency of product and

service. Ryanair has taken the lead for profit and return on investment in the European airline industry. IKEA has designed a high-volume business model for selling affordable, well-designed home furnishings. Searching for a new job in another state can be accomplished using Monster.com, which lists hundreds of thousands of jobs across the country. All these firms have effectively reconceived their business models over time in response to market change.

While competitors will always attempt to imitate the best practices of a market leader, a unique, difficult-to-imitate business model is often based on a unique competency or technology—or both. Dell's business model is based on a direct sales, customized product capability, and an information system that enables Dell to manage its supply chain efficiently. As a result, Dell has an average inventory of four days, while a typical competitor would have 40 days' inventory.

Markets are dynamic, and companies and nations respond slowly. An economic model for many industries called the "long tail" is emerging that is based on providing access to a massive number of selections to suit a wide range of customer tastes. Many industries show a demand curve that shows high appeal for the most popular items, but tailing off to low demand for the others. Companies like Amazon and Netflix can make a profit by selling low-demand products to people who access their website. More than 50 percent of Amazon's book sales come from titles outside its top 130,000. Netflix offers over 100,000 movie titles, while the average Blockbuster store can offer only 1,000. New ventures can potentially access the long tail via an Internet site and attract sales for less-popular items [Anderson, 2006].

Amazon.com started as a bookseller, but it now looks like the Wal-Mart of the Internet. Gas stations have evolved into convenience stores selling beverages, food, newspapers, and fuel. The entrepreneur within an existing company can help to build new value for customers and new profit for the company by reconfiguring the firm's business model before its competitors do theirs. One powerful way to find a new business model is to look for the customers' latent, unstated dissatisfactions with existing business practices.

Electric Cars in Israel

Better Place is an excellent example of an interesting business model. Founded in Israel in 2007 by Shai Agassi, Better Place seeks to create a complete infrastructure for electric cars in all of Israel. Israel is a country that has a particular interest in ending its dependence on foreign oil. It is also a relatively small country covering about 8,000 square miles. These market conditions have lent themselves to Better Place developing an innovative business model.

One of the major problems of electric cars is the long refueling time and the lack of infrastructure to support it. Better Place seeks to solve this

(continued on next page)

(continued from page 64)

problem by creating an electric car infrastructure from the ground up. The company plans to import its own electric cars and to provide the expensive batteries on a lease basis. The customer would pay a monthly fee not unlike a typical cell phone bill. Any time the electric car needs refueling, the customer can go to a Better Place station and have the battery replaced with a fully charged one without additional cost. Better Place is an example of a company with an unconventional business model that is uniquely well-suited to its market.

3.6 Core Competencies

The **core competencies** of a firm are its unique skills and capabilities. A capability is the capacity of the firm, or a team within the firm, to perform some task or activity. Firms with core competencies that match those necessary to effectively implement their business model have the best chance to succeed. It is very important that the core competencies of your firm match the requirements of your business. The core competency of Honda is the ability to design and build internal combustion engines of all sizes. The core competency of Intel is the ability to design and manufacture integrated circuits for computers and communication systems.

We care about competencies since they are the roots of competitive advantage. The real sources of advantage are found in the competencies of a firm. Core competencies include the collective learning in the organization, the skills of its people, and its capabilities to coordinate and integrate know-how and proprietary knowledge. Unlike physical assets, core competencies do not deteriorate as they are applied and shared. They can grow as a firm learns to build its competencies. Physical assets wear out, but intellectual assets such as core competencies can improve over time.

The core competencies of 3M are in designing and manufacturing materials, coatings, and adhesives, and devising various ways of combining them for new, valuable products. Honda's core competencies in engines and power trains have enabled it to provide distinctive products for lawnmowers, motorcycles, automobiles, and electric generators. Core competencies provide potential access to a wide variety of markets. Core competencies are the wellspring of new business ventures.

A successful firm's core competencies are valuable, unique capabilities that enable the firm to implement its business model and thus deliver a valuable product or service to its customers. These unique capabilities will be rare, difficult to imitate, and difficult to substitute.

Core competencies are dynamic by nature and an integral part of organizational learning and competence building. These distinctive capabilities are

those activities that a firm does better than its competitors. These competencies are the critical asset of a technology venture.

The core competency of Google is the design and operation of massively scaled Web services. It is the dominant online search engine. After starting as a search tool for finding information on diverse subjects, it has also become the leader in the Internet advertising industry.

3.7 Sustainable Competitive Advantage

The **competitive advantage** of a firm is its distinctive factors that give it a superior or favorable position in relation to its competitors. Competitive advantage is measured relative to a firm's competitors. A **sustainable competitive advantage** is a competitive advantage that can be maintained over a period of time—hopefully, measured in years. The duration, D, of a competitive advantage, CA, leads to the estimate of the market value, MV, of a firm as

$$MV = CA \times D \tag{3.1}$$

That is, the market value of the firm is proportional to the size or magnitude of the competitive advantage and dependent on the expected duration of that advantage. A pharmaceutical firm with a 20-year patent and a strong competitive advantage will be highly valued, indeed!

The competitive advantage of a firm is directly dependent on its core competencies, its assets, and its organization architecture. A firm such as General Electric is said to have a sustainable competitive advantage in the electric power industry. It has higher profit margins than all its competitors in this field.

In general, the more value, V, customers place on a firm's products, the higher price, P, the company can charge for these products. The cost of producing the products is C, and the profit margin is $P - C$. The company profits as long as $P > C$. The value created is $V - C$, and the net value to the customer is $V - P$. These relationships can be portrayed as shown in Figure 3.5. The profit margin, $P - C$, is vanishingly small in some very competitive industries where the competitive advantage is small or nonexistent for all the firms.

American Express invented the traveler's check as a means of getting money while traveling abroad. The value to the customer was high. The cost to issue the checks was low, and $(V - P)$ remained high to the customer. All parties have been pleased with this business model for more than 100 years [Magretta, 2002].

Many profitable firms are built on differentiation: offering customers something they value that competitors don't have. This unique offering can be in the product, service, or sales, delivery, or installation of the product. While the basic product may be a commodity, the differentiation can be obtained somewhere in the various interactions or services for the customer. Firms selling personal computers attempt to differentiate themselves by offering high-quality service. Harley-Davidson lends money to people to buy its motorcycles.

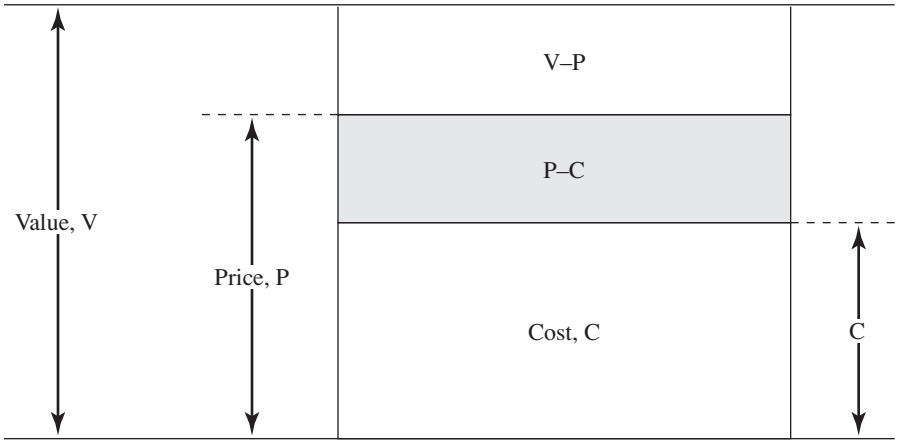


FIGURE 3.5 Value and return to the customer and the firm.

A competitive advantage is a significant difference in a product or service that meets a customer's key buying criteria. The sustainability of a firm's competitive advantage is a function of the competitors' difficulty in imitating or innovating around the incumbent's unique product or service attributes. One hospital service company successfully differentiates saline, a commodity product, by delivering it premeasured and frozen in plastic bags directly to hospital wards, thereby saving hospitals handling costs.

All firms seek to erode competitors' advantages by acting to *imitate* their product or service attributes or innovation.

Competitive advantage can be based on lower costs or differentiation of product or both. Most firms try to improve the efficiency of their operations to lower costs. They also strive to innovate or provide superior quality to outdo their competitors. Another point of differentiation can be in customer relationships. Examples of these approaches are shown in Table 3.11.

A firm can create new value and thus establish sustainable competitive advantage. The pyramid of value creation is shown in Figure 3.6. From a solid

TABLE 3.11 Potential sources of competitive advantage.

Source	Example
Efficiency, low costs	Alcoa
Product innovation	Intel
Quality, reliability	Mercedes
Customer responsiveness	Dell
Manufacturing innovation	Toyota

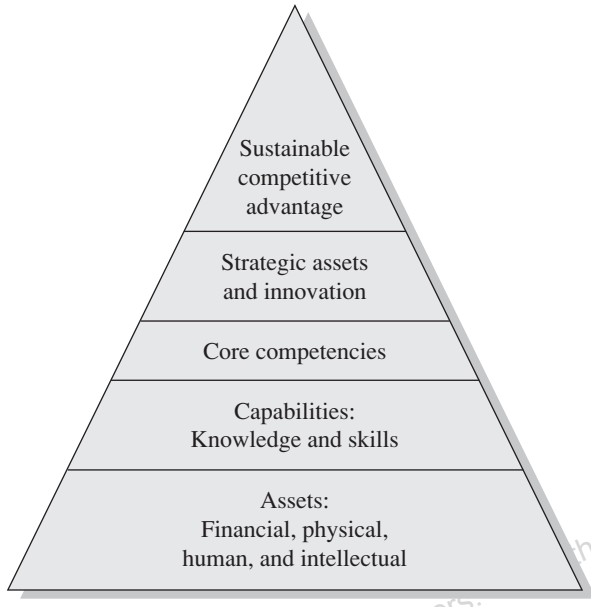


FIGURE 3.6 Pyramid of value creation.

base of assets, a firm builds its capabilities, which lead to its core competencies. With its core competencies and knowledge, it develops new products, processes, and other activities to build a competitive advantage. The sustainability of a firm's competitive advantage depends on its ability to continually innovate.

The duration, D, of a competitive advantage is longer when it is difficult to imitate. This difficulty is present when unique skills and assets are required and hard for a competitor to replicate or obtain.

In 1876, Sir Joseph Lister, a longtime advocate of improving sanitation conditions, was invited to speak at a medical conference in Philadelphia. In attendance was Robert Wood Johnson, who became inspired by Lister's speech. In 1886, Johnson, joined by two of his brothers, started Johnson and Johnson in order to manufacture a line of sterile surgical dressings. After experiencing some success, the company diversified into other segments of the medical industry. The company now manufactures pharmaceuticals and medical devices for physicians and consumers alike. Their products, including Tylenol, Band-Aids, and Listerine, are well-known and trusted in the United States. The core competency of Johnson and Johnson is the ability to select and market trusted, useful products. Their consistency in doing so allowed the company to retain a sustainable competitive advantage over the last century.

Selling the vision of the sustainable venture requires a passionate commitment to the venture. Candy Lightner started a nonprofit organization called

Mothers Against Drunk Driving (MADD) after her 13-year-old daughter was killed by a drunk driver in a hit-and-run accident. She communicated the vision of the organization with a passion born of loss and injustice.

The most powerful new venture provides a great sense of value at a reasonable price resulting in a high ratio of value to price for the customer. With an added sense of emotion or importance, the potential success of a venture can be seen as the ratio:

$$\text{Potential success} = \frac{\text{Value} + \text{Emotion}}{\text{Price}}$$

Clearly, organizations such as Doctors Without Borders and MADD incorporate the powerful emotion of a cause or importance.

A business model is the result of a firm's decision about how a business should be structured. The securities brokerage industry, in the past, operated on a theory of high commission fees and personal service. In the 1990s, the model changed to low commission fees and reduced personal service. Few business models are unchallenged.

Core competencies built by a firm that have the potential to generate value can be a source of competitive advantage in the marketplace. For airlines, one important capability is providing a memorably pleasant experience to passengers during flight. In the software services business, a dominant capability lies in the combination of high quality and low cost. Having capabilities that are distinctive and difficult for others to imitate can give your firm sustainable competitive advantage.

Ten types of sustainable competitive advantage are given in Table 3.12.

TABLE 3.12 Ten types of sustainable competitive advantage.

Type	Example
■ High quality	Hewlett-Packard
■ Customer service	Dell
■ Low-cost production or operation	Wal-Mart
■ Product design and functionality	Google
■ Market segmentation	Facebook
■ Product-line breadth	Amazon.com
■ Product innovation	Medtronic
■ Effective sales methods	Pfizer
■ Product selection	Oracle
■ Intellectual property	Genentech

3.8 AgraQuest

Like the hungry microbes in its natural products, AgraQuest is eating its way into the $28 billion global pesticide market—a field dominated by chemical giants Dow, DuPont, and Monsanto. Steering the biotech start-up into the fray is company president and CEO Pam Marrone, an international expert in agricultural biotechnology and biopesticide science. Marrone has led AgraQuest in its vision to research and develop safe and environmentally friendly alternatives for farm, home, and public health pest management.

Natural products are nonliving substances such as proteins and enzymes that are produced by organisms such as microbes and plants. Every day, scientists at AgraQuest make their rounds, carefully checking and rechecking various biological experiments and meticulously recording their findings. They check out new samples of soils, plant roots, or lichen arriving from across the globe, hoping that one will lead to the next breakthrough natural, environmentally safe pesticide or fungicide.

The vision statement for AgraQuest is given in Table 3.13. The vision of this company is to make a difference in the worldwide agricultural industry by providing pesticides and herbicides that do not cause environmental problems.

The mission statement, provided in Table 3.14, is clearly stated and motivational in character. The vision and mission statements are useful to provide information about the company to employees, investors, and other stakeholders.

The value proposition of AgraQuest must clearly state the key values for the firm, while also identifying those values that will match the competition. The five core values for the firm are provided in Table 3.15. The dominant value is to ensure that the efficacy of the product is as good as that for chemicals

TABLE 3.13 AgraQuest's vision statement.

Agriculture badly needs safer, biodegradable pesticides that fit well in pest management systems in order to create an environmentally sustainable agricultural system. The goal is to reduce the use of synthetic chemicals on the nation's farms and ranches. AgraQuest develops its own natural product pesticides that meet its criteria for in-house development and aggressively licenses or acquires natural products from outside the company to reduce the time line until market entry. AgraQuest discovers new pesticidal natural products from microorganisms and sells these natural compounds to agrochemical companies for non-core markets. AgraQuest plans to build a natural pesticide and herbicide business that will make a difference in world agricultural practices and environmental impacts. We will be the premier source of pest management knowledge and technology, and be accountable to our customers, our shareholders, our families, our community and ourselves.

TABLE 3.14 AgraQuest's mission statement.

AgraQuest discovers, develops, manufactures, and markets effective, safe, and environmentally friendly natural products for farm, home, and public health pest management.

TABLE 3.15 Five values for AgraQuest's products.

Dominant value: Product—The efficacy of the product is equivalent to that of chemicals, but it also can be used right up to harvest time. Furthermore, natural products are less susceptible to pest resistance buildup. It also is safer, reliable, and easy to use.
Differentiating value: Experience—A "green," natural product that is environmentally friendly and can lead to more sustainable agriculture and healthy conditions worldwide
Expected norm value: Price
Expected norm value: Service
Expected norm value: Access

while providing safer products that can be used right up to harvest time. The differentiating value is that of a "green," natural product than can lead to a sustainable agricultural system. AgraQuest matches its competitors on price, service, and access. The value proposition is provided in Table 3.16.

The unique selling proposition for AgraQuest is:

Innovative natural product solutions for pest management

The business model of AgraQuest is given in Table 3.17. AgraQuest could be well positioned to grow in the global pesticide market. Its challenge is to exploit its differentiation as a natural, "green," and safe product in a somewhat skeptical agricultural industry.

TABLE 3.16 AgraQuest's value proposition.

AgraQuest discovers, develops, manufactures, and markets effective, safe, and environmentally friendly natural products for pest management that serve worldwide agriculture and make it more environmentally sustainable.

TABLE 3.17 Business model for AgraQuest.

■ Customer selection	Farmers with higher-value products who want a safer "green," natural pesticide solution
■ Value proposition	"Green" products for herbicide and pesticide use at comparable efficacy and price
■ Differentiation	Natural products that can be used right up to harvest time
■ Scope of product	A moderate range of natural products
■ Organizational design	A flat organization with good communication
■ Value capture	Reasonable costs and growing revenues allowing for net positive income
■ Value for talent: Scientists and staff	Opportunity to work in an organization with a "green" mission

3.9 Summary

The theory of a business is a description of the elements required for the entrepreneur to act to build a business that satisfies the customers' needs. Coupled with the firm's core competencies and resources, the firm uses the elements of its business design to build a sustainable competitive advantage. The elements of a firm's theory of its business include: vision, mission, value proposition, business model, competitive advantage, and how it acts to retain a sustainable competitive advantage.

- Great vision is a statement of purpose (or story) in response to an opportunity.
- The mission describes the firm's goals, products, and customers, providing a theory of change for all to see.
- The value proposition describes customer needs that will be satisfied.
- The business model describes the economics and activities of the new enterprise.
- The firm strives to create a competitive advantage and make it sustainable.

Principle 3
The vision, mission, value proposition, and business model embodied within the business design of a firm and powered by a sustainable competitive advantage can lead to compelling results.

Video Resources

Visit http://techventures.stanford.edu to view experts discussing content from this chapter.

Don't Write a Mission Statement Write a Mantra	Guy Kawasaki	Garage
Innovate in Technology and Business: The Founding of Google	Larry Page, Eric Schmidt	Google
Beyond Socially Responsible Business	William McDonough	McDonough + Partners
The Product Vision	Pam Marrone	AgraQuest

3.10 Exercises

3.1 How would you define Google's vision? Construct a mission statement for Google. After completing both of these tasks, go to Google's website and compare its actual corporate mission statement to your impression.

3.2 Social networking takes advantage of a compelling trend toward leveraging social connections to link people for viral marketing and

affinity marketing. Compare and contrast the value propositions offered by these leading social networking sites: MySpace, Facebook, Linkedin, and Friendster.

3.3 Compare the business models for Yahoo and Google using Table 3.8. Make sure to identify how they are different. How do you see their business models evolving over the next five years?

3.4 Purchasing a used car is one of the least desirable experiences for most people. eBay Motors offers fraud protection, a warranty, and a title history (www.ebaymotors.com). What is the value proposition for eBay Motors? Would you buy a car using eBay?

3.5 Twitter.com continues to see explosive user growth. However, a business model has yet to materialize. Describe three business models Twitter could pursue to become a profitable business.

3.6 The branded and generic pharmaceutical industries have continued to grow rapidly over the past decade. Describe how branded pharmaceutical companies have innovated their business models to address the generic drug market. Generic drug companies have also experienced challenges as the sector has grown globally. How have these companies responded?

3.7 Apple has been successful in expanding its product and service portfolio from computers to MP3 players to mobile phones. What are Apple's business models? Describe the core competencies that have allowed Apple to make the moves from Mac to iPod, and from iPod to iPhone.

3.8 Woot.com is an online seller of mainly closeout products at a cheap price. This site provides low-priced sales and an online community to talk about the product of the day. Visit Woot.com and determine the business model of the firm. How does Woot generate a profit for this service?

VENTURE CHALLENGE

1. Create a brief vision statement for your venture.

2. State the value proposition for the venture.

3. Create a draft business model for the venture using the elements of Table 3.8.

4. What are your venture's core competencies and competitive advantage?

CHAPTER 4

Competitive Strategy

Praise competitors. Learn from them. There are times when you can cooperate with them to their advantage and to yours.
George Mathew Adams

CHAPTER OUTLINE

How can a venture create a strategy to fit the new business opportunity?

Every new venture has a strategy or approach to achieve its goals. This strategy is in response to its plan to implement a solution to an important problem or opportunity. The process for creating a strategy for a new firm is shown in Table 4.1. Steps 1 and 2 were described in Chapter 3. With sound vision and mission statements and an initial business model, the entrepreneur examines the political and economic context of the industry, along with its growth rate and typical profit margins (step 3). Once the industry is understood, steps 4 and 5 are used to describe the firm's strengths and weaknesses and its opportunities and threats (SWOT). In step 6, the entrepreneur integrates his or her knowledge of the industry and competitors with his or her own SWOT to identify key success factors. Based on the information gathered in the preceding steps, the entrepreneur refines his or her vision, mission, and business model and creates a strategy to achieve a sustainable competitive advantage. The formation of cooperative alliances with other enterprises can be an important way for a new venture to position itself within an industry. Long-term success depends upon addressing the needs of all stakeholders and acting in a responsible manner. ■

TABLE 4.1 Management process for developing a strategy.

1.	Develop the vision and mission statements, and the business model.
2.	Describe the firm's core competencies, its customers, and its competitive advantage.
3.	Describe the industry and context for the firm and its competitors.
4.	Determine the firm's strengths and weaknesses in the context of the industry and environment.
5.	Describe the opportunities and threats for the venture.
6.	Identify the key factors for success using the six forces model.
7.	Formulate strategic options and select the appropriate strategy.
8.	Translate the strategy into action plans with suitable measures and controls.

4.1 Venture Strategy

A **strategy** is a plan or road map of the actions that a firm or organization will take to achieve its mission and goals, but it is not static. Imagine the difficulties of navigating through most towns with a map from 1900. In other words, a strategy is a firm's theory about how to compete successfully within the current realities of its industry. To be useful, the plan must be action-oriented and based on the firm's opportunities, strengths, and competencies. For example, the most efficient route for a cyclist to move from point A to point B may be different for a motorist. A corporate or organizational strategy is an integrated plan for the whole organization [Hill and Jones, 2001]. It is a firm's way of doing things and a theory of business [Drucker, 1995]. The desired outcome of a strategy is a sustainable competitive performance. Because of the dynamic nature of the competitive business world, a strategy has to be simple and clear. This allows everyone to work on a commonly understood plan.

Strategies help to set a firm on a course and then focus their efforts on it. Often, a strategy emerges as actions are taken and tested, eventually converging toward a pattern [Mintzberg et al., 1998]. With a strategy, the firm can differentiate its offerings and activities. For some, the essence of strategy is choosing what not to do [Magretta, 2002]. The process for developing a strategy is summarized in Table 4.1.

A strategy is a response to opportunity. The word *opportunity* is derived from the Latin expression "toward the port." The builder of value is like a merchant sea captain who secures the right payloads from the best customers, manages his crew, and adjusts his mix of established ports and new ports with high potential [McGrath et al., 2001]. The formulation of a sound strategy is based on deep knowledge of the opportunity, the industry, and its context. In describing the opportunity as a vision, a sense of drama and vitality emerges. With this vitality, the entrepreneur motivates the team and the investors to share the

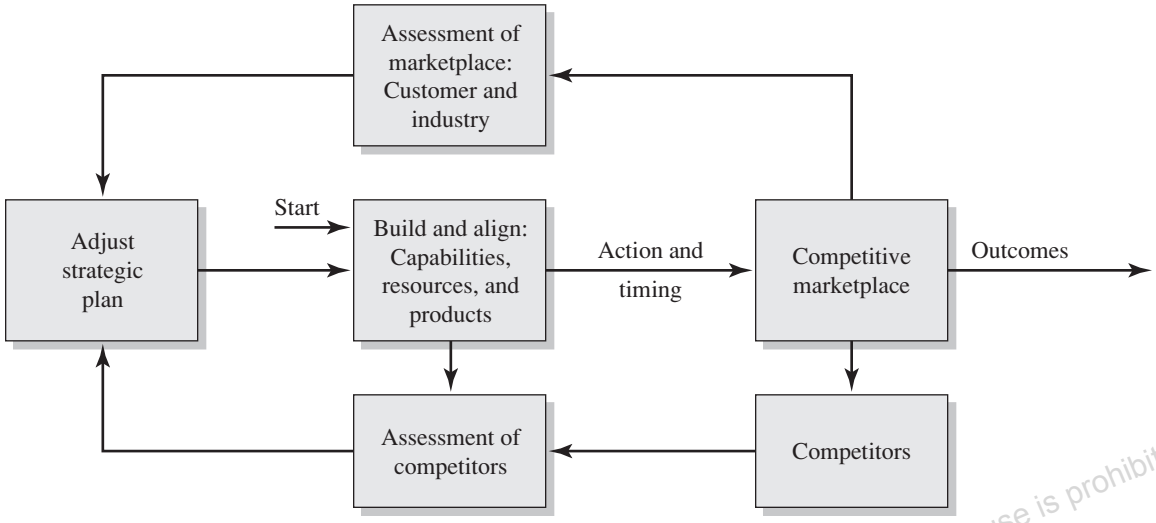


FIGURE 4.1 Framework for a firm operating in a dynamic marketplace.

vision, embrace the strategy, and act on it. In this case, the strategy emerges as the details unfold.

Long-term planning is very difficult due to the dynamic nature of the competitive marketplace. Industries are not in equilibrium, and industry analysis is difficult. It is hard to define where an industry begins and ends. Also, it is difficult to distinguish competitors from collaborators from suppliers. Thus, all strategies are subject to change and reemergence as conditions, alliances, and competition change.

Entrepreneurs start in the center of Figure 4.1 by building and aligning their capabilities, resources, and products. They then act on their initial strategy or business plan. Entry into the competitive marketplace will force a reassessment of the marketplace and industry as well as their competitor analysis. This leads strategic managers to redeploy and adjust the capabilities, resources, products, and actions to effectively compete in the dynamic market. These managers strive to attain a competitive advantage by securing and managing the assets of the firm. How the internal management responds to a changing customer, industry, and competition is crucial in the reestablishment of the strategic plan and the firm's assets to act competitively. Venture leaders strive to identify the fundamental forces for creating and capturing customer value. Those who focus on continuously adjusting and aligning a firm's strategy and capabilities will constantly evolve from one strategic position to the next strategic position in response to changing conditions.

GE Aircraft Engines (GEAE) provides an example of an adjustment in a strategic plan as a result of changes in the market. GEAE had a product strategy to develop engines with more power, efficiency, and better reliability.

Because of relentless competition and shorter product cycles, sustaining profitability was difficult. GEAE shifted to operating as an engine production and services provider, generating significant profits in the after-market services business [Demos et al., 2002]. Faced with a dynamic marketplace, the strategic leader develops a strategic response and adapts to the changes in the market.

To summarize Figure 4.1, the first step is to determine the basic driving forces in the industry: the economic, demographic, technological, or competitive factors that either constitute threats or create opportunities. The second step is to formulate a strategy that addresses the driving forces identified in step 1. The third step is to create a plan to implement the new strategy. Finally, the new strategy is implemented by building and realigning the firm's capabilities, resources, and products.

Entrepreneurs define their strategy within their perception of opportunity. They are not constrained by the present resources or capabilities but seek to acquire the necessary resources and capabilities. The theory of resource dependence states that a company's freedom of action is limited to satisfying the needs of customers and investors that give it the resources to survive [Christensen, 1999]. Investors and customers dictate how money will be spent because companies that do not satisfy them will be unable to survive.

A good strategy answers the questions asked by Kipling [1902]:
I keep six honest serving-men (They taught me all I knew);
Their names are What and Why and When and How and Where and Who.

The six questions for creating a sound, dynamic strategy are summarized in Figure 4.2. With solid, effective answers to these six questions, a firm will have formed a strategy that has the potential to lead to profitability.

Profitability		
Why are we pursuing this objective? • Vision • Mission	Where will we be active? • Customer • Market	How will we achieve our objective? • Innovation • Acquisitions
When will we act and at what speed? • Timing • Execution	What will differentiate our product? • Positioning • Competitor response	With whom will we compete and cooperate? • Competition • Alliances

FIGURE 4.2 The six questions for creating a dynamic strategy. Profitability rests on six solid answers to these questions.

A strategy can be viewed as a plan that integrates a firm's goals and actions into a cohesive whole that draws effectively on its resources and capabilities. The essence of strategy is choosing the priorities and deciding what to do and what not to do. The strategic priorities determine how a business is positioned relative to the alternatives. As the competitive conditions change, the new venture adjusts its strategy to meet the new conditions.

The development of a strategy often uses reasoning by analogy [Gavetti and Rivkin, 2005]. For example, Staples began by asking: "Could we be the Toys-R-Us of office supplies?" Analogical reasoning makes efficient use of information, but can be built on superficial similarities and inaccurate information. It is necessary to understand the source of the analogy and check the similarities.

4.2 The Industry and Context for a Firm

The eight steps for developing a strategic plan are outlined in Table 4.1. In the remaining sections of the chapter, we will discuss steps 3 through 8 since steps 1 and 2 were described in Chapter 3. In this section, we address step 3 of Table 4.1. Also, multiple methods exist for understanding the activities of Figure 4.1. We will highlight some of them in this and later sections.

A full description of the customer and the industry will help the entrepreneur build a sound strategic plan. The main elements of an industry analysis are given in Table 4.2. The first step is to accurately name and describe the industry in which the firm is or will be operating. The definition should be narrow and focused. An **industry** is a group of firms producing products that are close substitutes for each other and serve the same customers. Thus, selecting the telecommunications industry may be too broad. The definition of the industry should be more focused, such as "the Internet service provider industry serving homes and businesses in Ohio and Indiana." If data are not available for the targeted area of the market, the closest proxy should be used. For example, if statistics are not available for Ohio and Indiana, they may be available for the Midwest or the United States. Then, define this market and describe the customer. The second step is to describe the regulatory and legal issues within the industry. Both national, as well as state and local regulations, should be considered. Also, changes in regulations can influence both industry-funding trends and particular types of companies within an industry [Sine et al., 2005].

TABLE 4.2 Five elements of an industry analysis.

1.	Name and describe the industry.
2.	Describe the regulatory, political, and legal issues in this industry.
3.	Describe the growth rate of the industry and the state of the evolution of the industry.
4.	Describe the profit potential and the typical return on capital in the industry.
5.	Describe the competitors in the industry and the rivalry among them.

TABLE 4.3 Four stages of an industry life cycle.

Stage	Examples
1. Emergence	Artificial organs
	Nanotechnology
	Genomics
2. Growth	Medical technology
	Software
	Smart phones
3. Maturation	Electric appliances
	Automobiles
	Personal computers
4. Decline	Steel
	Fax machines
	Car phones

The third step of Table 4.2 suggests describing the growth rate and state of evolution of the industry. Most industries tend to emerge through an initial period of slow growth with limited sales and few competitors. Then, they expand through a period of rapid growth as sales take off and many firms enter the industry. This is followed by a third period of maturation marked by slower growth and stability. Eventually, the number of firms in the industry declines [Low and Abrahamson, 1997]. We depict in Table 4.3 these four stages as (1) emergence, (2) growth, (3) maturation, and (4) decline. It is important to know where your industry is in the evolution cycle. In the emerging phase, significant product and market uncertainty exists. Producers are unsure of what features are required for the product. Customers may be unsure of the elements of the product they need. Many technology ventures begin in the emerging phase of an industry. For a technology venture, an emerging industry will not yet have a dominant design and will respond well to new firms with a wealth of knowledge that can be used to build a powerful new venture [Shane, 2005].

The growth stage emerges when the necessary features and performance become clear and a dominant design emerges. A **dominant design** is one whose major components and core concepts do not substantially vary from one product offering to another. With the emergence of a dominant design, the number of competitors stabilizes.

Eventually, an industry enters its mature phase as the number of competitors stabilizes and profit margins slowly decline as price becomes the primary competitive weapon. Finally, an industry enters a declining phase as the number of firms decline and profit margins erode. These four phases are described in Table 4.3.

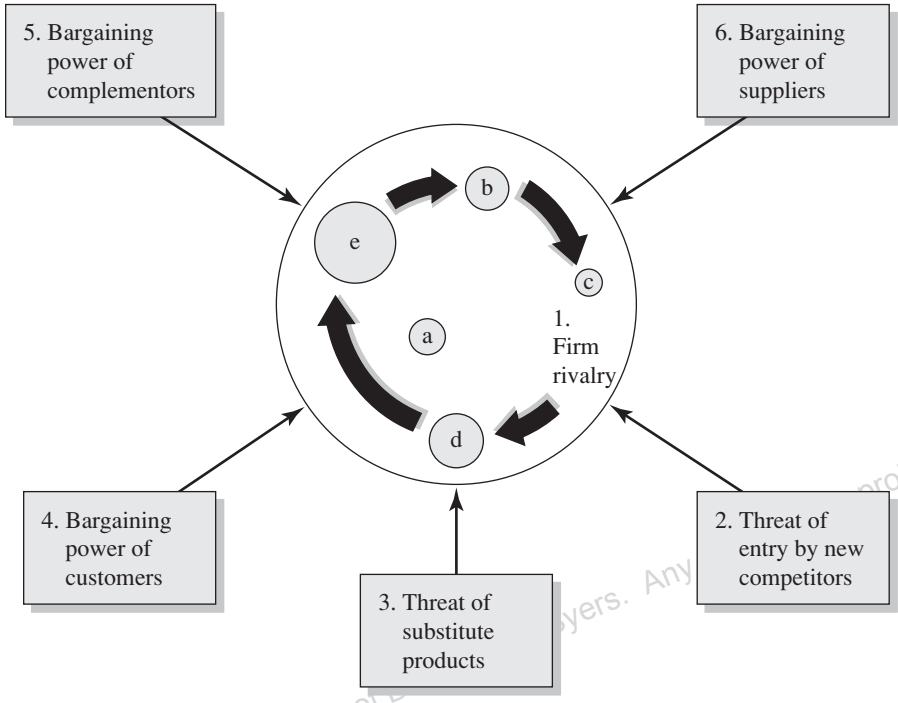
The personal computer market began in 1978, with a number of small, emerging firms such as Apple Computer. IBM entered the personal computer market in 1982, and its PC quickly emerged as the dominant design. Many other firms entered after IBM made the design open to all, and the PC industry experienced a growth phase between 1984 and 1998. Eventually, the market reached a period of maturity, with only a few dominant firms having standardized or slightly differentiated products and relatively stable sales and market shares.

Table 4.2 shows that the next step in the industry analysis is a statement of the profit potential and the typical return on investment capital in the industry. The **return on capital** is defined as the ratio of profit to the total invested capital of a firm. The average return on capital in the computer software industry is about 16 percent, while the return on capital in the steel industry is about 6 percent. The steel industry is less attractive, while the computer software industry is attractive. One of the most effective ways to identify realistic profit opportunities for a new venture is to look at the Securities Exchange Commission filings of a young representative firm in the industry (www.sec.gov).

The **six forces model,** shown in Figure 4.3, is one popular method for evaluating the competitive forces in an industry. The six forces are: (1) firm rivalry, (2) threat of entry by new competitors, (3) threat of substitute products, (4) bargaining power of customers, (5) bargaining power of complementors, and (6) bargaining power of suppliers. This framework is an extension of the five forces model [Porter, 1998]. The six forces model enables the analyst to consider all the issues facing a new entrant by describing the key industry factors. The rivalry among the industry competitors may be intense or modest. In some industries, the bargaining power of the customer may be modest.

Consider the automobile industry, which has about 10 competitors. The rivalry is extremely intense. The bargaining power of customers regarding a new vehicle is very high since they have access to broad information on the relative performance and price of the products of the competitive companies and their dealers. The bargaining power of the suppliers in the industry is modest. Furthermore, the threat of a substitute product is small. The threat of new entrants is very small, due to the costs of developing a new product and dealer network. Thus, the auto industry experiences intense competition with the buyer wielding significant power.

Consider the online bookselling industry: Amazon.com and Barnesand-Noble.com are the two large online booksellers in the United States, but there are many regional competitors such as Powells.com. The rivalry among these competitors is high. Their suppliers have low bargaining power, and the barriers to entry are moderate. The bargaining power of the customer is large, resulting in low prices, and profitability is modest. The threat of substitute products is low. However, e-books could undermine the printed book industry as more attractive devices emerge such as Amazon's Kindle.



Note: Firms are represented by a circle; for example, (a) represents firm a. The size of the circle indicates the size of revenues of the firm. The six forces are numbered for clarity. The rivalry of the firms is shown as a vortex of competition illustrated by the solid arrows.

FIGURE 4.3 Six forces model.

By contrast, many new firms enter the computer software industry each year. The bargaining power of customers is moderate, and the threat of substitute products is low. As a result, profitability in the industry is high. However, the rivalry of the firms is intense.

A competitive analysis explains how you will do better than your rivals. And doing better, by definition, means being different. Organizations achieve superior performance when they are unique, when they do something no other business does in ways that no other business can duplicate. In military competition, strategy refers to the large-scale plan for how the generals intend to fight and win a war. The word *tactics,* in contrast, refers to small-scale operations, such as the conduct of a single battle [Clemons and Santamaria, 2002]. Very few strategic plans survive the first contact with competitors. Competitors respond and change the situation.

Complementors are companies that sell complements to the enterprise's own product offerings. A **complement** is a product that improves or perfects another product. For example, the complementors to Sony's PlayStation 3 and Nintendo's Wii are the companies that produce the video games that run on

these consoles. Without an adequate supply of complementary products, demand for the player product would be modest. The complementary product to the automobile is the interstate road system that enables automobiles to safely and rapidly travel long distances. Without suitable, widely located electric recharge stations, the future of electric vehicles is very limited.

The entrepreneurial firm is likely to be a new entrant to the industry. Thus, the new venture should describe the barriers to entry, the threat of substitutes, and the bargaining power of the suppliers, customers, and complementors. One of the main factors that drives traditional analyses of the determinants of market structure involves comparing the size that a firm must be to compete efficiently to the overall size of the market in which it competes. If the industry has few firms, a new firm may be able to readily enter and gain market share. Using the six forces model, a new technology venture is likely to perform better when it operates in an industry with high barriers to entry, low rivalry, low threat of substitutes, low buyer power, low supplier power, and low bargaining power of complementors.

In Figure 4.3, examine the bargaining power of the suppliers. When the supplier industry is composed of many small companies and the buyers are few and large, the buyers tend to dominate the supply companies. An example is the automotive component supply industry in which the buyers are few and large and dominate the many small suppliers.

To complete the industry analysis, it will be necessary to name the competitors and describe the profitability of the industry. One method is to use *Standard and Poors Reports* or the *Value Line Investment Survey.* For example, if the new firm is entering the biomedical devices industry, the leading competitors are Medtronic and Boston Scientific. Using Value Line, we note that the average return on total invested capital for these companies is 15 percent. Value Line projects a 13 percent future growth rate of sales for this industry. With these attractive measures, the industry appears to be very attractive to new entrants with well-differentiated, fairly priced products.

4.3 Strengths and Opportunities—SWOT Analysis

Steps 4 and 5 of the management process for developing a strategic plan (Table 4.1) suggest that a strategy is based on the firm's strengths and opportunities, while avoiding or mitigating its weaknesses and managing threats. As discussed in chapters 2 and 3, a new firm is focused on securing the capabilities and resources necessary to succeed in its industry. Furthermore, the new firm concentrates on an attractive opportunity that was selected using Table 2.6. Thus, a strategy addresses the four aspects of the setting in which a firm operates: (1) a firm's strengths, (2) its weaknesses, (3) the opportunities, and (4) the threats in its competitive environment. This analysis is often called a SWOT analysis, which allows a firm to match its strengths and weaknesses with opportunities and threats and find the purpose for which it is best suited.

A firm's strengths are its resources and capabilities. Its weaknesses are its limitations of organization or lack of capabilities or resources. A firm's opportunities

TABLE 4.4 SWOT analysis for Amgen.

Organizational (internal)	Environmental (external)
1. Strengths: ■ Expertise in development and manufacturing of biologic drugs (e.g., proteins and antibodies) ■ High-margin products and limited competition	1. Opportunities: ■ Expansion of marketed products for new geographies, indications, and formulations ■ Allocation of resources to discover novel therapeutics to sustain growth
2. Weaknesses: ■ Inability to discover novel therapeutics to avoid declines in revenue	2. Threats: ■ Pharmaceutical companies entering the biologics arena ■ Competition from follow-on biologics and pricing pressures

are its chances for success in a new entry or product in its industry. The threats are actions or events outside its control in the competitive environment.

A basic SWOT analysis for Amgen is given in Table 4.4. The SWOT analysis provides the questions for a strategic response and helps a firm exploit its strengths, avoid or fix its weaknesses, seize its good opportunities, and mitigate its threats. Examples of threats are market shifts, regulatory changes, and delays in product development. Positive opportunities include increasing demand, repeated use, and willingness to pay.

We can examine opportunities in three dimensions, as shown in Figure 4.4. Perhaps the safest strategy is to take new products to existing customers via existing distribution channels using existing approaches. We can call the three

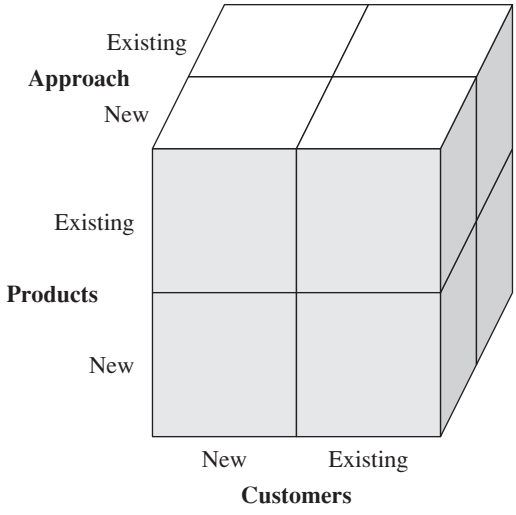


FIGURE 4.4 Three dimensions for examining opportunities.

dimensions: products, customers, and approach [Black and Gregersen, 2002]. Approach is the method or means of taking the product to the customer. The most risky strategy would be a new product taken to new customers via a new approach. Amazon.com started selling books (existing products) to book buyers (existing customers) via a new approach—online.

4.4 Barriers to Entry

Barriers to entry are factors that make it costly for companies to enter an industry. The greater the costs that potential competitors must bear to enter an industry, the greater are the barriers to entry. The six potential barriers to entry are listed in Table 4.5. Economies of scale can be a barrier in industries where the costs of production are low for a narrow range of volume or occur only for higher volumes. An example is the aircraft design and production industry. It is difficult to enter that industry since a low volume of production of aircraft is most likely uneconomic for the new entrant [Barney, 2002].

Cost advantages independent of scale may be held by existing companies and will deter a new company from entering. For example, incumbent firms may have proprietary technology, know-how, favorable geographic locations, and learning-curve advantages. These can all be barriers to a new entrant.

Product differentiation means that incumbent firms possess brand identification and customer loyalty that serve as barriers to new entrants. For example, Dell, Hewlett-Packard, and Apple have brand and customer loyalty, making it difficult for a new personal computer company to enter the industry on a large scale. Of course, this barrier may be less important to a specialty manufacturer that seeks a small niche in the personal computer market. A formidable barrier to entry is the reputation or brand equity of the incumbents. Providing ratings for bonds is an attractive industry since it is not asset-intensive and the profit margins are very good. If a new firm tries to enter this market, it would have to compete with Moody's and Standard and Poors, both competitors with strong reputations.

Contrived deterrence as a barrier occurs when incumbent firms strive to throw up unnatural barriers at a cost to them. They can use lower prices, newer

TABLE 4.5 Potential barriers to entry into an industry.

- Economies of scale
- Cost advantages independent of scale
- Product differentiation
- Contrived deterrence
- Government regulation
- Switching costs

products, or brand building to send a signal to potential entrants that intense responses will result if they try to enter. For example, a potential entrant to television broadcasting is deterred by government allocation of regular broadcast channels. A response to this limitation is for the new entrant to choose another means such as cable as the distribution channel—for example, the Fox Channel.

Two kinds of economic markets exist: substitutable and nonsubstitutable. Substitutable products are commodities such as groceries, cola drinks, and gasoline. In a nonsubstitutable market such as semiconductor manufacturing equipment, the required associated infrastructure means that once purchasers choose a system, they are not inclined to switch due to high switching costs.

Switching costs are the costs to the customer to switch from the product of an incumbent company to the product of the new entrant. When these costs are high, customers can be locked into the product of the incumbents even if new entrants offer a better product. An example is the cost of switching from Microsoft to the Apple computer operating system. Users would need to purchase a new set of software to use on the Apple computer as well as train their employees to use the new software.

Low Barriers to Entry in Web 2.0

Web 2.0 start-ups have been attractive to some entrepreneurs because the market seems relatively easy to enter. To them, it is a growth industry with low barriers to entry. The cost to set up a website is relatively low. Creating a website requires technical and programming knowledge, but modest capital investment. This industry offers an opportunity for entrepreneurs with little financial backing to create a product for a huge market quickly. Website services can easily be made accessible worldwide, without the need for physical distribution channels.

4.5 Achieving a Sustainable Competitive Advantage

Recall from Chapter 3 that a core competency is a matchless strength that a firm can use to achieve superior operating conditions that lead to a strong competitive advantage. A SWOT analysis helps the entrepreneur identify this unique competency. The unique competency of a firm arises from its capabilities and resources, as shown in Figure 4.5. Resources are financial, human, physical, and organizational, and include patents, brand, know-how, plants and equipment, and financial capital. The capabilities of a firm include skills, methods, and process management. It is the usefulness of both capabilities and resources in a coordinated way that leads to distinctive competencies. A firm must have: (1) a valuable set of resources and the capability to exploit those resources, or (2) a unique capability to manage common resources. Intel possesses unique

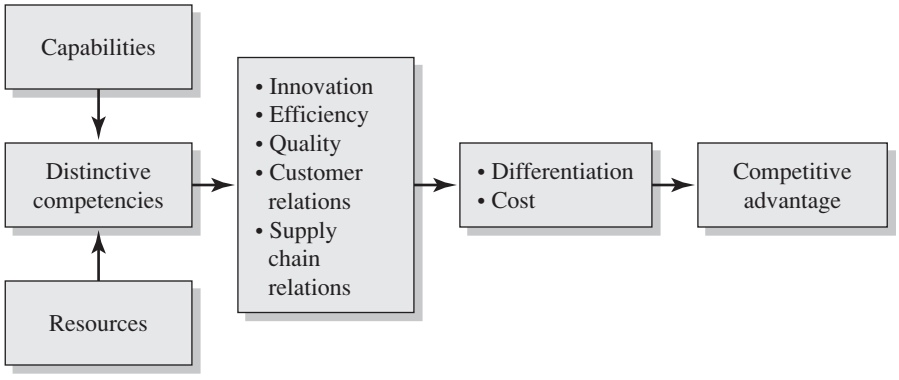


FIGURE 4.5 Distinctive competencies lead to a competitive advantage.

patent and know-how resources and the capabilities to exploit that knowledge and intellectual property. Ryanair and Southwest possess common resources—aircraft and aircraft equipment—but have unique capabilities to manage these resources. Disney has unique resources in its film library, brand, and theme parks but a mixed record of managing them well.

If a new technology venture possesses a particular valuable resource, then that firm can gain a competitive advantage and thus improve its efficiency and effectiveness in ways that competing firms cannot [Barney, 2001].

As shown in Figure 4.5, a firm uses its unique competencies to manage its innovation, efficiency, product quality, customer relations, and supplier relations to differentiate its product and manage its costs. A technology venture works to design and produce at a low cost the highest-quality product that possesses unique differentiating factors. Four common ways in which a firm will distinguish itself from its competitors are differentiation, cost, combined differentiation and cost, and niche, as summarized in Table 4.6.

TABLE 4.6 Four common types of strategies and their characteristics.

	Type of strategy			
Factor	**Differentiation**	**Low cost**	**Differentiation-cost**	**Niche**
Distinctive competencies	Innovation and relationships	Processes, logistics	Innovation and processes	Relationships
Product differentiation	High	Low	Medium	Medium
Market segmentation	Many segments	Mass market	Many segments	One or two segments
Examples	Intel	RadioShack	Dell	Getty Images
	Microsoft	Wal-Mart	Southwest Airlines	Incyte

The goal of a differentiation strategy is to create a unique product based on a firm's unique competencies. The low-cost strategy is based on unique competencies that enable the efficient management of processes. Many firms can achieve a combined differentiation–low-cost strategy that blends the best of low cost and differentiation. The niche strategy is directed toward one or two smaller segments of a larger market. This niche can be geographic or a product or price segment.

Intel's Competitive Advantage

Since the founding of Intel, its strategy was focused on technology leadership, first-mover advantage, and the dominance of important new markets. Intel emerged as the dominant supplier of microprocessors, which are used in 90 percent of personal computers. Intel is also a leading manufacturer of flash memory, embedded control chips, and communication chips. A unique competency is Intel's ability to build, manage, and exploit the world's best semiconductor manufacturing facilities. As an example of its technology leadership strategy, Intel announced a new material that will replace silicon, enabling Intel to build more density (transistors per area) while reducing heating and current leakage. For decades, Intel has had a successful differentiation strategy.

Niche ventures often require less capital and achieve financial success rather quickly. Typically, a niche business is too small for the mass-market supplier, and thus, competition is low. A niche can be geographic or a product or price segment. Niche businesses typically are started in one market segment and based on a focused core competency and good customer and supplier relationships.

Southwest Airlines is an example of an airline that started as a niche, low-cost business operating only in Texas. It served three cities—Dallas, Houston, and El Paso—and operated using standardized Boeing 737 aircraft. It used highly productive crews, frequent, reliable departures, and a no-frills (low-cost), short-haul, point-to-point system. Eventually, Southwest moved to other western states and many locations across the nation. Thus, its strategy evolved from a niche strategy to a differentiation-cost strategy.

Fastenal Company of Winona, Minnesota, is the largest distributor of nuts and bolts in the United States. It uses a low-cost strategy for its manufacturing and distribution business with about 2,200 warehouse stores achieving total sales exceeding $2 billion. Each store has at least one delivery truck. Customers talk to the local store and receive personal service. Fastenal sees itself as an inventory and delivery manager offering excellent customer service. It currently has a fleet of 4,100 pickup trucks that respond to customer orders on an expedited basis (www.fastenal.com).

A differentiation strategy is commonly based on an innovation or capability others do not possess. Led by Carlos Perea, Miox is a New Mexico-based venture that produces water purification systems. Traditionally, these systems used volatile and hazardous chlorine gas. Miox developed a technology that allows their products to function using only salt and water (www.miox.com).

Paychex is an example of a company with a differentiation-cost strategy. It provides payroll-processing services and began by targeting small- and medium-sized businesses that needed this service. The company offers customer service and payroll accuracy at a reasonable price, leading to wide acceptance. Once it has a satisfied customer, the switching costs for this customer are sizable. Paychex's revenues have grown to over $2 billion, and it serves more than 540,000 businesses. Paychex's annual revenue growth rate has been greater than 18 percent for over 20 years.

With good hardware and friendly software, Apple's portable player made a profitable business out of digital music—a business that eluded Sony, Microsoft, and Napster. What was the strategy that Apple adopted that led to success? The iPod was introduced in 2001, but it was the iTunes online-music store, introduced in 2003, that caused the iPod to take off. Apple sold more than 40 million iPods in 2008. Furthermore, iTunes sold 400 million songs in the first year and 5 billion songs through 2008. The iPod is easy to use, readily portable, and able to synchronize automatically with iTunes to download songs. Apple used the differentiation-cost strategy of Table 4.6 to achieve rapid success.

IKEA provides furniture to customers who are young, not wealthy, likely to have children, and work for a living. These customers are willing to forgo service to obtain low-cost furniture. IKEA designs its own low-cost, modular, and ready-to-assemble furniture. In large stores, it displays a wide range of products. While IKEA is a low-cost provider, it also offers several differentiated factors, such as extended hours and in-store childcare. Its strategy is a differentiation-cost strategy.

Some firms attempt to create new markets by breaking the existing value/cost trade-off [Kim and Mauborgne, 2005]. For example, it became possible for music, video, and videogames to be downloaded to your cell phone. This disruptive strategy created a new market for direct delivery of media.

4.6 Alliances

Many businesses use competitive strategies to shape their business strategies but often ignore *cooperative* strategies. Business is a complex mix of both competition and cooperation. A new venture possesses valuable novelty and innovation that will attract the attention of suppliers, customers, competitors, and complementors, acting as a value network, as shown in Figure 4.6. All the participants are connected and participate in this network of activity. Consider the value network for a university, shown in Figure 4.7

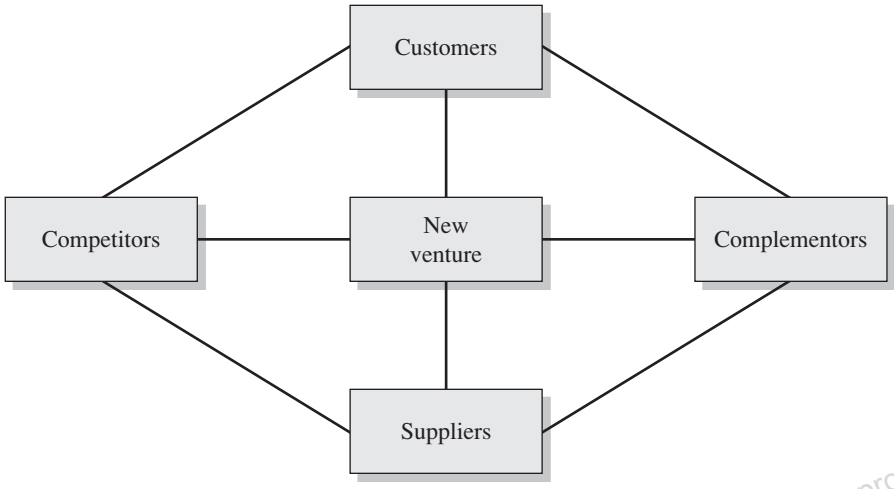


FIGURE 4.6 Value network.

[Brandenburger and Nalebuff, 1997]. The complementors to a university include kindergarten through grade-12 schools, local housing, community activities, and computing systems. All the members of the value network are connected together in the higher education value network. The university, to succeed, must cooperate with its suppliers, customers, competitors, and complementors. Competitors can be seen as rivals but also will be, in many instances, collaborators.

Many technology ventures offer products or services that require distinctive strategies because the products are parts of systems with complements provided by others. If a platform leader emerges and works with complementors, an ecosystem of innovation is formed [Gawer and Cusumano, 2008]. A platform strategy requires a compelling vision and strong leadership. A platform product or technology should provide a core function and be easy to connect for complementors. Examples of platform leaders are Google and Microsoft.

The value network is important to entrepreneurial ventures as they strive to accumulate the resources and capabilities required for success. The value of exploiting complementary resources can be significant [Hitt et al., 2001]. For example, a smaller, new biotechnology firm and a large pharmaceutical firm can both benefit from an alliance. The biotech firm provides new technologies and innovation, while the pharmaceutical firm provides the distribution networks and marketing capabilities to successfully commercialize the new products. The larger established pharmaceutical firm also gains value through access to its partner's innovation. Thus, firms usually search for partners with complementary assets or capabilities. An excellent example of complementary partners is Google and Firefox. The default start page for Firefox is the Google search engine, bringing Web traffic to Google.

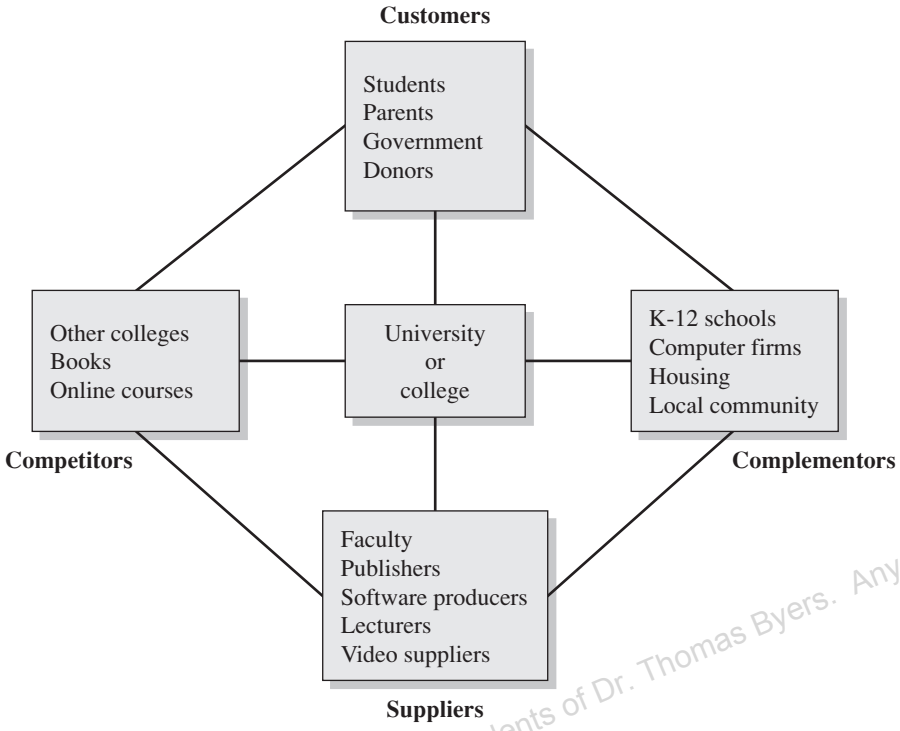


FIGURE 4.7 Value network for a university or college.

Google provides Firefox both monetary compensation and a popular search product for its users. This is a partnership that enhances the value of each participant.

A **partnership** or **alliance** is an association of two or more firms that agree to cooperate with one another to achieve mutually compatible goals that would be difficult for each to accomplish alone [Spekman and Isabella, 2000]. Proactive firms take the initiative rather than react to events. Proactive formation of strategic alliances is an important dimension of entrepreneurial activity that enables a new firm to acquire access to unowned but required strategic assets. All alliances are based on some exchange of knowledge in addition to a flow of products, capital, or technology. Alliances function best when mutual benefits and commitment are clear to all parties [Lee et al., 2005].

The configuration of alliances of a start-up impacts its early performance. External alliances can substitute for internal resources. A firm's decision to enter an alliance can be motivated by a desire to exploit an existing capability or technology, or to explore for new opportunities and new technologies [Rothaermel and Deeds, 2004].

The new firm should consider developing an alliance when it lacks the necessary assets that a complementor can provide. To select a partner, it must

be clear which missing capabilities or resources are required. Then, it must determine which firms possess those assets and look at their characteristics. It will be necessary to build a relationship of trust with the potential partner and craft an agreement that will yield benefits for both partners [Doz and Hamel, 1998]. For example, the alliance that Alibaba.com and Yahoo! made in 2005 allows Yahoo! access to the Chinese market while Alibaba gains significant capital and expertise in scaling from Yahoo!.

Alliances have a variety of structures and are usually governed by a contract that delineates the roles and responsibilities of each partner. Complementor firms may also be potential competitors. Many a well-conceived alliance has fallen apart due to the tension between cooperative and competitive forces. These can be culture clashes, poor conflict management, and lack of effective coordination mechanisms. Furthermore, the entrepreneurial firm may be seeking access to needed assets but may, as a result, be exposed to the risk of losing its own vital internal knowledge. An example of this occurred during the development of the Apple Macintosh. Apple partnered with Microsoft to develop spreadsheet, database, and graphical applications for the Mac. As a result, Microsoft acquired critical knowledge about Apple's graphical user interface products, which eventually enabled its engineers to develop the Windows operating system [Norman, 2001]. Knowledge transfer occurs in conversation and association and is difficult to control. Starbucks wants to share its expertise with its partners. When it places its coffee shops in Barnes and Noble stores, it makes sure the bookstore employees at its counters are well versed in the Starbucks way of doing things.

Cell Phones and Gaming

As mobile phones became more and more popular, a significant opportunity arose for the development of software for these devices. In particular, significant potential was seen for sales of games for mobile phones. Jamdat developed a number of these games, including the popular Bejeweled. In order to distribute these games, it had to form an alliance with mobile phone service providers like Verizon Wireless and Cingular (now AT&T). The service providers controlled the only distribution channel for these games. Because of the partnerships it was able to establish, the company also served as a link between other game developers and service providers. Acting as a gaming publisher in this way is now one of the company's main functions. Jamdat was purchased by Electronic Arts in 2006 and is now called EA Mobile.

The benefits of alliances can be significant. Both firms learn and acquire new capabilities. Furthermore, they have access to complementary resources that they cannot easily duplicate. An entrepreneurial new venture wisely will consider the

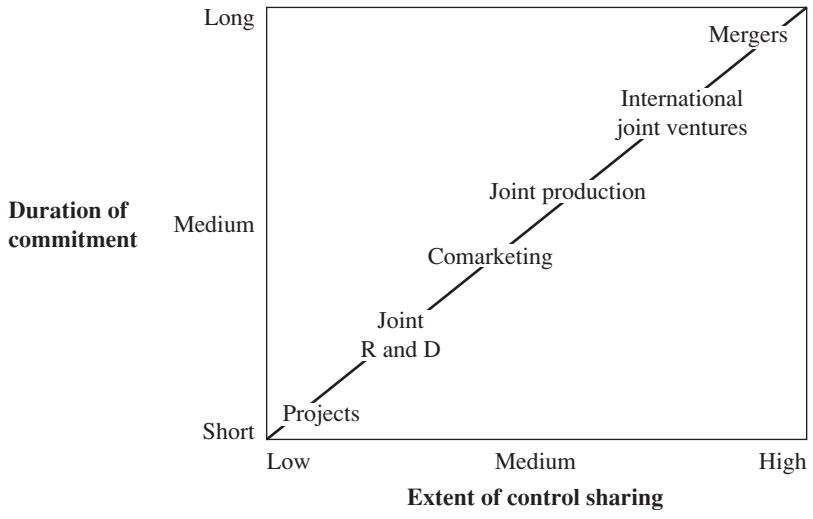


FIGURE 4.8 Range of alliances dependent on commitment and control sharing.

development of one or two partnerships consistent with its strategic goals. Going it alone can be a major liability for entrepreneurs. Innovators who get together in alliances can be more successful, especially where uncertainty prevails. Few start-up firms will have all the necessary capabilities and resources, and alliance networks can enable them to move forward effectively. The type of alliance can range from a joint short-term project to a merger, as shown in Figure 4.8.

Although a portfolio of alliances can be powerful, alliances also place significant demands on an organization's management capability. Different types of alliances also require different types of management. Thus, too many alliances can actually harm an organization's performance and it is critical to examine each potential alliance for both the benefits it brings and the time, resources, and attention it will require [Rothaermel and Deeds, 2006]. Table 4.7 outlines five simple rules for effectively managing alliances [Hughes and Weiss, 2007].

TABLE 4.7 Five simple rules for making alliances work.

1.	**Develop the right working relationship** by specifying how you will work together
2.	**Peg metrics to alliance progress**, not just progress toward alliance goals
3.	**Leverage differences**, rather than trying to eliminate them
4.	**Encourage collaboration** by moving beyond formal structures
5.	**Manage internal stakeholders** to ensure that all involved players are committed to the success of the alliance

Source: Hughes and Weiss, 2007.

In particular, it is necessary to build real working relationships and establish effective collaborative behavior [Hughes and Weiss, 2007]. Failed alliances are usually due to a breakdown in trust and communication. True collaboration rests on a real relationship, not a contract.

4.7 Matching Tactics to Markets

A company can be said to be successful if it outperforms its competitors over time. Another view of how to formulate the best strategy for a venture is to match the firm's approach to the pace of the market. Table 4.8 summarizes three competitive approaches [Eisenhardt and Sull, 2001]. The first approach is based on establishing a *position* in an industry and defending it. The goal is to position the company so that its capabilities provide the best defense against the competitive forces of Figure 4.3 [Porter, 1998]. Furthermore, the positioning approach can be defended by anticipating shifts in the six forces of Figure 4.3 and responding to them.

The second method focuses on *resources,* such as patents and brand, and attempts to leverage those resources against the resources of the competitors. For example, the powerful brand of Southwest Airlines has enabled the firm to issue its own Visa card to many of its customers.

The third approach may be called *emergent* and is based on flexible and simple rules [Eisenhardt and Sull, 2001]. Firms using this method to develop a strategy select a few significant strategic processes and build simple rules to guide them through the ever-changing marketplace. The strategic processes could be innovation, alliances, or customer relationships. Dell, for example, has

TABLE 4.8 Three types of competitive tactics.

	Position	Resources	Emergent
Approach	Establish a position and defend it	Leverage resources such as brands, patents, or assets	Pursue emerging opportunities
Firm's basic question	Where should we be?	What should we be?	How should we take our next step?
Basic steps	Identify an attractive market Locate a defensible position, and fortify and defend it	Acquire unique, valuable resources	Choose one or two core strategic processes and use them to guide to the next step
Works best in	Slowly changing, well-understood markets	Moderately changing, well-understood market	Rapidly changing, uncharted markets
Duration of competitive advantage	Relatively long (3–6 years)	Relatively long (3–6 years)	Short period (1–3 years)
Risk or difficulty	Difficult to change position	Difficult to build new resources, if needed	Difficult to choose best opportunities
Performance goal	Profitability	Long-term dominance	Growth and profitability

chosen its customer relationships and customized products as its basic strategy. It then adjusts this strategy as conditions require.

Cisco Systems used an innovation strategy to guide it through emergent opportunities for its first years of operation. Later, it changed to a basic strategy of acquisitions to respond to rapidly changing markets. These basic tenets for guidance in emerging markets may be called simple rules and are summarized in Table 4.9 [Eisenhardt and Sull, 2001]. These rules allow a firm to compete in a fast-moving marketplace such as the emergent markets that many technology ventures start in.

A good way to understand strategic planning in emerging industries is to imagine an American football team trailing by a touchdown with only two minutes left to play, and it has the ball. The team refuses to panic. It has well-established rules of play for this situation. It switches to the "no-huddle" offense, with the quarterback calling the plays at the line of scrimmage as he surveys the defense.

Uncertainty is endemic in strategy formulation. Thus, the quality of a strategy cannot be fully assessed until it is tried. Strategy making can be thought of as an organizational capability, where different approaches are generated and considered, and where past successful approaches are just options for the future among many.

Sam Walton started with a strategy based on low-cost retail discount stores. He gained differentiation by locating many of these stores in relatively rural cities that were only large enough to support one large discount retail operation. His second differentiating factor was his organizational culture, which inspired his employees. As competition emerged, he developed one of the most cost-efficient distribution networks based on information technology systems. Walton's simple rules of strategy and operation were part of Wal-Mart's success.

In addition to matching the approach to the pace of the market, Table 4.10 highlights two key factors for determining a successful strategy: (1) specific industry-related competence, and (2) the existing level of competitive rivalry in the industry [Shepherd et al., 2000]. The venture capitalists who participated in Shepherd's study stated in summary: The most attractive strategy is led by a team that

TABLE 4.9 Simple rules for emergent markets.

Rules	Purpose	Example
Boundary	State which opportunities can be pursued	Cisco acquisition rule: No more than 75 employees in an acquired company
Priority	Rank the possible opportunities	Expected return on investment
Timing	Synchronize the selection of opportunities and the conditions of the firm	When product must be delivered
Exit	Know when to pull out of opportunities	Key team member leaves

TABLE 4.10 Factors for determining a successful strategy, in priority order.

1.	Industry-related competencies: Distinctive competencies
2.	Competitive rivalry: Low rivalry in the industry
3.	Time of entry: Enters industry early at appropriate time
4.	Educational capability: Able to obtain the skills, knowledge, and resources required to overcome market ignorance
5.	Lead time: Significant time between the pioneer's entry and the appearance of the first follower

has strong competence in an industry that has not yet built up intense rivalries. The timing of entry may be favorable in these circumstances.

The success of a new venture arises, in part, from a fit between the distinctive competencies of the venture team and the major success factor requirements of the industry. The better the fit, the greater is the competitive advantage. A competitive advantage is sustainable if the competencies of the venture quickly track and match the changing requirements of the industry. In addition, it is important to build alliances with critical stakeholders, such as suppliers or distributors, thus erecting barriers to new entrants.

Every business strategy is unique since it is a unique mix of resources, context, goals, competencies, and organizational values. The potential for differentiation of a firm's strategy can also occur along a selected part of the consumption sequence shown in Figure 4.9 [McGrath et al., 2001]. Unique

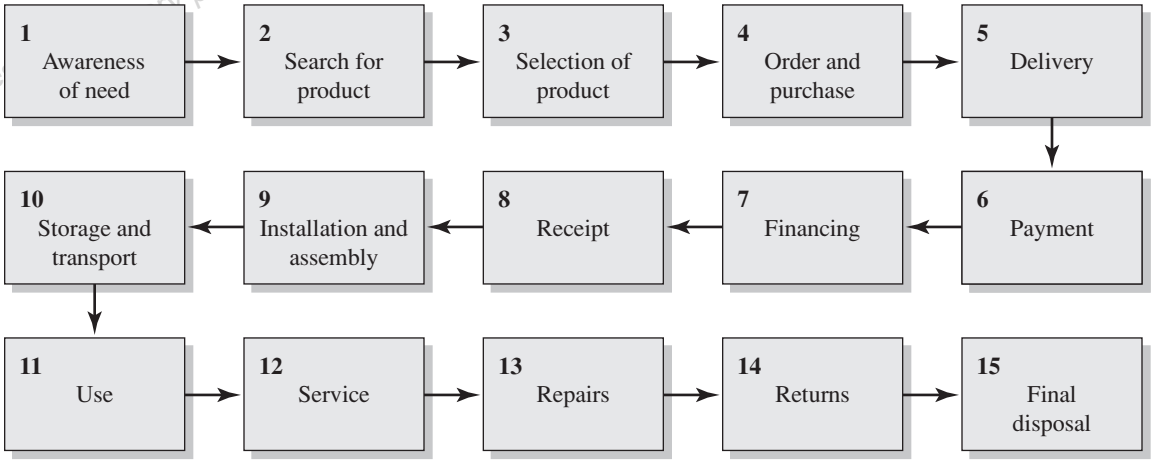


FIGURE 4.9 Consumption sequence.

methods, tools, or arrangements can be used at each step in the sequence. Every new technology venture should look at the consumption sequence and decide where it can differentiate its product or service.

The power of Dell Computer is its direct sales model offered to three different customer segments. The Dell direct sales model incorporates all 15 steps of the consumption sequence. On the other hand, CDW (www.cdw.com) acts as a middleman reseller for Hewlett-Packard and offers excellent customer service for the purchaser who needs help in choosing a computer. Its large sales force helps customers choose a total system that fits them, and a single salesperson is assigned to each customer for follow-up and later purchases. The CDW sales model incorporates steps 3 through 10 of the consumption sequence.

4.8 The Socially Responsible Firm

Any strategy adopted by a new venture firm inevitably affects the welfare of its stakeholders: customers, suppliers, stockholders, and the community. While a specific strategy may enhance the welfare of some stakeholders, it may harm others. The leaders of new ventures are challenged to build a strategy that attempts to meet the economic and social needs of stakeholders while protecting the social and environmental needs of its region. An explicit statement of a new firm's strategy for acting responsibly and ethically may be an appropriate part of a business plan [McCoy, 2007].

The quality of life on our planet depends on three factors, as illustrated in Figure 4.10. The quality of life in a society depends on equity of liberty, opportunity, and health, and the maintenance of community and households, which can be called **social capital,** or social assets. The growth of the economy and the standard of living are critical needs for all people; we call this **economic capital,** or economic assets. Finally, the environmental quality of a region or the world can be called **natural capital.** The interrelationship between these three factors adds up to the total quality of life. Quality of life includes such basic necessities as clothing, shelter, food, water, and safe sewage disposal. Beyond that, quality of life includes access to opportunity, liberty, and reasonable material and cultural well-being [Dorf, 2001].

Business, government, and environmental leaders need to build up capabilities for measuring and integrating these three factors and using them for decision making. We define the sum of these factors as the **triple bottom line.**

As they strive to treat nature and society respectfully while enhancing people's quality of life, corporations need to use nature only for what is necessary and in balance with what can be recycled and replenished.

Recognizing the interconnectedness and interdependence of all living things, corporate leaders can seek a balance using the triple bottom line concept. Economics, ecology, and society can be portrayed as a whole that depends on the person, the corporation, cultural values, and the community. Decisions

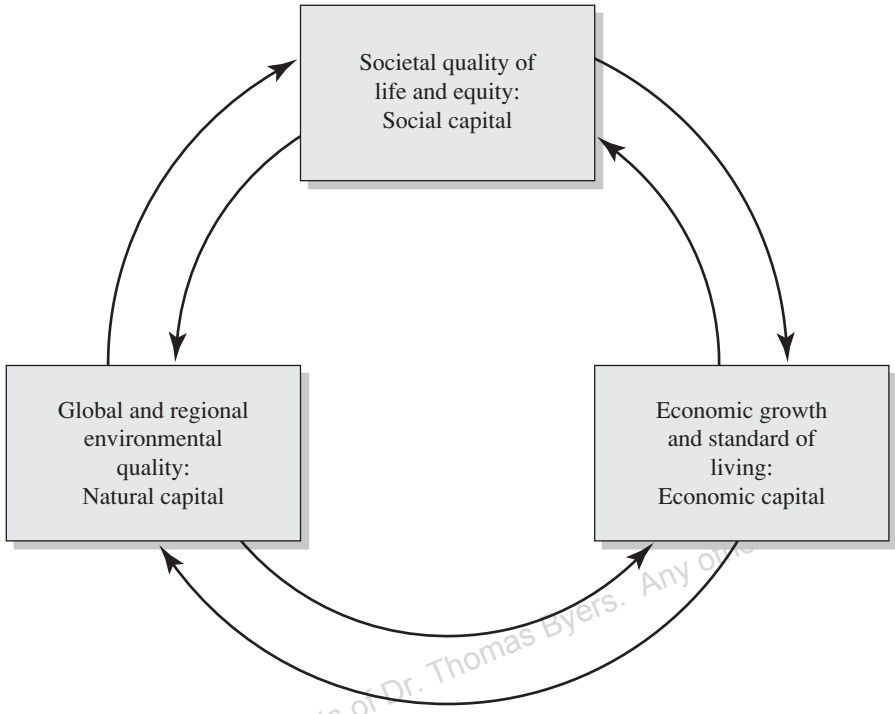


FIGURE 4.10 Three interrelated factors that determine the quality of life on our planet.

made by corporations or society need to account for all the three factors of the triple bottom line.

For many, there is a presumption that a company exists to enhance the welfare of society at large. For others, the only goal is the maximization of profits. We assert that the public welfare can be in the best interest of the corporation itself. One of the purposes of a firm is to make a profit—but service of society is also an implied expectation. In many ways, socially responsible behavior—remembering its obligations to its employees, its communities, and the environment, even as it pursues profits for shareholders—is in a firm's self-interest. A growing number of companies make corporate responsibility part of their value proposition. For example, Henry Ford believed he should pay his workers enough to afford to buy the cars they produced. His decision ultimately benefited Ford Motor Company by making it an attractive employer and stimulating demand for its products.

Some of the best companies in history have tended to pursue a mixture of objectives, of which making money is just one—and not necessarily the primary one. For Merck, a top priority is patient welfare. For Boeing, it is advancement of aviation technology. Profitability is a necessary condition for

existence, but it is not the end in itself for many visionary companies. Consider Johnson & Johnson, whose credo, published in the early 1940s, was the basis for its response to the 1982 Tylenol crisis, when a cyanide tampering incident caused the deaths of seven people in the Chicago area. The company quickly removed all Tylenol capsules from the entire U.S. market at a cost of $100 million, though the deaths occurred only in Chicago.

BioFuelBox and GreenFuel: Fuel from Waste Products

BioFuelBox and GreenFuel Technologies are start-ups that have developed innovative processes for producing biofuels from waste products, avoiding the negative consequences of fossil fuels. GreenFuel produces a photosynthetic bioreactor that is fed exhaust from industrial reactors. The exhaust is converted into nutrients, which allow the algae in the bioreactors to multiply. The algae are harvested to yield a substance called algae oil. This oil is then used in the production of a variety of materials including plastics, ethanol, and biodiesel.

BioFuelBox's technology uses undesirable products like waste trap grease and wastewater sludge to produce biodiesel fuel from a small plant colocated next to this waste. Its technology turns what is currently trash into a highly valuable commodity. This approach of converting waste to profit not only is more environmentally friendly, but also has great economic benefits. Since many companies currently pay to get rid of their trap grease or process their exhaust, BioFuelBox and GreenFuel can get their source materials at low to no cost. New ventures such as GreenFuel and BioFuelBox often find that it is possible to strive for both profitability and social responsibility.

The social virtue matrix of Figure 4.11 illustrates the four possible responses to social responsibility challenges. The response of the lower-left quadrant (box 3) is conduct that corporations engage in by choice, in accordance with norms and customs. The lower-right quadrant (box 4) represents compliance—responsible conduct mandated by law or regulation [Martin, 2002]. These two lower quadrants represent the basic commitment of companies to society's values and laws. Actions in the two lower quadrants (boxes 3 and 4) of Figure 4.11 generate little credit since the public expects actions to be in compliance with its laws and norms. The most significant impediment to the growth of corporate virtue is limited vision for actions beyond compliance and allegiance to society's norms.

The two upper quadrants encompass activities that have high social virtue. The strategic benefits quadrant (box 1) includes activities that may add to shareholder value by generating positive reactions from customers, employees,

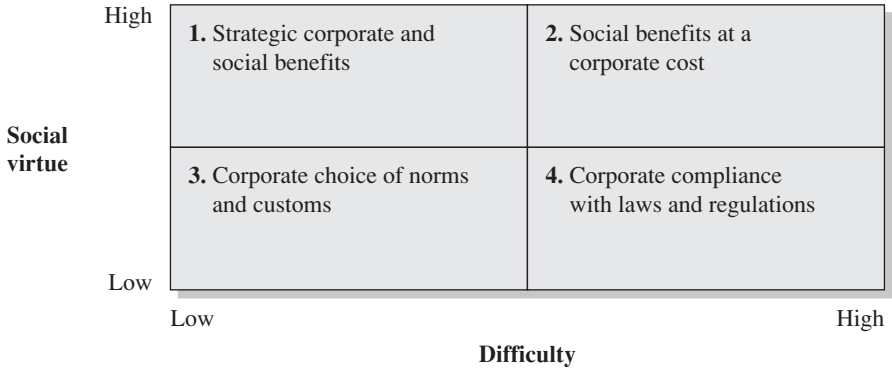


FIGURE 4.11 Social virtue matrix.

or legal authorities. These actions may ultimately benefit the firm by accruing customer goodwill and community support. The upper-right quadrant (box 2) encompasses activities that clearly benefit society or the environment, but at a cost to the corporation.

An example of a firm active in the upper-left quadrant (box 1) is Patagonia, founded by Yvon Chouinard in 1979 as a designer, marketer, and distributor of high-performance outdoor wear with a commitment to protect the natural environment. The firm sought the use of low-impact fibers and drifted to organic cotton by 2000. Patagonia considered three criteria during the design and development of a project: its quality, its impact on the environment, and its aesthetics. In support of their commitment to sustainability of the environment, the firm featured a speaker series of prominent environmentalists. Furthermore, it often shared information with other clothing firms regarding the use of environmentally favorable fabrics.

One great opportunity to enter business in the top-left quadrant (by offering strategic corporate and social benefits) is to stimulate commerce at the bottom of the economic pyramid. For example, an entrepreneur can help the world's poor by partnering with them to innovate new products and services that are valuable and profitable [Prahalad, 2005]. While individual incomes may be low, the aggregate buying power of poor communities is actually quite large, representing a substantial market in many countries. In these markets, entrepreneurs need to reconsider their focus on high gross margins and shift toward securing good returns on invested capital while delivering social and environmental benefits [Prahalad and Hammond, 2002].

Environmental challenges represent another opportunity to enter business in the top-left quadrant. Businesses that combat environmental degradation can be both profitable and socially beneficial [Dean and McMullen, 2007]. New technologies and business models can help build a sustainable world incorporating clean energy, drought-resistant crops, sound fish farming, biodiversity,

TABLE 4.11 Sampling of highly ranked, socially responsible companies.

■ Apple	■ General Electric	■ Procter & Gamble
■ BMW	■ Google	■ Steelcase
■ Cisco	■ Johnson and Johnson	■ Toyota
■ FedEx	■ Microsoft	■ UPS
■ Hewlett-Packard	■ Nordstrom	

Source: Fortune's Most Admired Companies, 2008.

and much more. Non-fossil fuel sources of energy such as wind, solar, hydro, geothermal, and biofuels will be developed over the next 10 years as we shift to lower-impact fuel systems. New technology ventures will emerge as entrepreneurs find new means for big opportunities [Sachs, 2008].

Actions in the upper-right quadrant (box 2) may ultimately engender benefit for shareholders. However, actions that provide benefits to society at a cost to a firm are difficult to defend to shareholders. For example, if only one automaker had decided to add air bags, it would lose some profits. When such an addition is mandated, all automakers can provide added social benefits at a competitive cost. Corporate coalitions, in which firms agree to provide benefits despite the costs, can also help firms take action in the upper-right quadrant.

The public wants information about a company's record on social and environmental responsibility to help decide which companies to buy from, invest in, and work for. As an example, see Starbucks website at http://www.starbucks.com/aboutus/gr.asp. Starbucks estimates that it saved about $36 million because the company's socially responsible actions increased employee loyalty and reduced turnover. The Mexican cement company Cemex helps low-income families construct concrete homes, helping to tackle housing problems while connecting the company with a large and untapped market [Austin et al., 2007]. Good deeds can redound to a company's credit. But, they can also backfire if the company fails to live up to the good-neighbor image it tries to project. Fifteen highly ranked, socially responsible companies are listed in Table 4.11.

4.9 AgraQuest

AgraQuest has a business model, as given in Table 3.17. The basis of AgraQuest's strategy is differentiation of its product. Its natural products have no environmental impacts, they can be used right up to harvest, and pests do not build up resistance to them as they do to chemicals. Thus, the differentiation is the efficacy of the product compared to chemical pesticides and herbicides.

The industry that AgraQuest participates in is the agricultural pesticide and herbicide industry. The goal of using pesticides is to increase the yield per acre

of the crop. The industry is heavily regulated by the U.S. Environmental Protection Agency (EPA), as well as state agencies such as the California EPA. The global pesticide market (2001) is about $28 billion. The largest portion (26 percent) of the market consists of fruits, nuts, and vegetables. AgraQuest's target markets are grapes, tomatoes, peppers, bananas, lettuce, apples, cherries, and home gardens.

AgraQuest's biologically based products fight plant pests and diseases with as much success as synthetic chemical pesticides and compete favorably on cost, pest resistance, shelf life, ease of use, food and worker safety, and environmental impact.

The first useful microorganism was found by one of the AgraQuest scientists in a handful of dirt from a Fresno farmyard. Lab tests showed that the bacterium had an appetite for the fungus that causes bunch rot and mildew in grapes. At that point, AgraQuest went to work on finding a formula to grow the beneficial bug in industrial quantities.

Although the exact formula is proprietary and secret, this is how AgraQuest goes about creating it. A flask of bacteria is dumped into a 10,000-gallon tank filled with a special food source. Forty-eight hours later, the gooey slime in the tank is harvested. To create a usable product, the bacterial concentrate is dried so that it becomes something resembling powdered milk. The powder is put into 24-pound bags and shipped to the farmer, who dumps it into a spray tank, mixes it with water, and applies it just like a chemical fertilizer.

AgraQuest's competitors include many firms worldwide such as Valent Biosciences, Chicago; Dow Agrasciences, Indianapolis; BASF, Germany; Syngenta, Switzerland; and Bayer, Germany.

The barriers to entry are significant since an entrant must have the technical capabilities as well as recognition and reputation in the natural pesticide industry. The biggest strength of AgraQuest is its scientific capability to identify, develop, and manufacture microorganisms for agricultural pesticide control. This capability is the strength of AgraQuest and critical to the firm's success in the industry. The weakness of AgraQuest is its limited ability to build a large product line of products for various crops in a timely way.

The differentiated product strategy based on a strong scientific capability is sound, but its weakness is in the delay of creating new products. The economics of the natural pesticide market requires a product line in place that creates a positive cash flow.

4.10 Summary

The strategy of a new business venture is its plan to act to achieve its goals. Given the challenge of an important problem (opportunity), the strategy provides a road map for the new firm to act to achieve a profitable solution to the problem. The strategy is designed to solve the problem by creating a unique and sustainable way of acting that, it is hoped, will lead to

a profitable and valuable outcome for the customer and the firm. A solid strategy is based on:

- Sound knowledge of the industry and the context for the venture.
- A deep understanding of the firm's strengths and weaknesses as well as its opportunities and threats.
- A solid competitor analysis and review of the six forces encountered by firms in a rival market.
- A strategic design that can lead to a sustainable competitive advantage.
- A choice of a differentiation, low cost, differentiation and low cost, or niche strategy that provides unique value to the customer.
- Formation of productive alliances with others and always acting in a socially responsible manner.

Principle 4
A clear road map or strategy for a new venture states how it will act to achieve its goals and attain a sustainable competitive advantage in a socially responsible manner.

Video Resources

Visit http://techventures.stanford.edu to view experts discussing content from this chapter.

Problem-Solving Paradigm	Vinod Khosla	Khosla Ventures
Alliances and Collaboration	Dr. Don Francis	Vaxgen
Honing in on the High Points of Clean Tech	Erik Straser	MDV
Social Responsibility from the Ground Up	Mitch Kapor	Foxmarks
Surviving Competition	Jeff Housenbold	Shutterfly
Understanding Your Customer	Pam Marrone	AgraQuest

4.11 Exercises

4.1 Zipcar offers a sophisticated form of car sharing (www.zipcar.com). The firm opened for business in Boston in late 2000. Describe the strategy of Zipcar using the six questions of Figure 4.2. Is the Zipcar strategy sustainable, and will it lead to profitability?

4.2 Podcasting, blogging, online photo sharing, online video, and twittering are five technologies that are enabling a much broader set

of content publishers and content consumers. Describe the nature of these industries and analyze the competitive situation using all six forces in Figure 4.3.

4.3 Cypress Semiconductor is an integrated circuit chip company in a very competitive industry. Identify the firm's core industry and key customers. Complete a SWOT analysis for the firm following Table 4.4.

4.4 Nektar is an innovative drug delivery company creating differentiated products to allow for the inhalation of a number of medicines. Examine Nektar's website and publicly available information. Describe Nektar's strategy using Tables 4.6 and 4.8.

4.5 During the 1990s, DVD players became widely available and the rental DVD market took off. NetFlix (www.netflix.com) initiated an online DVD rental service creating a new market. Examine the Netflix website and determine the firm's basic strategy. What are the challenges to its strategy? Consider the timing of the initiation of NetFlix: was it too early or right on time? How have Blockbuster and Wal-Mart attempted to differentiate their online services from NetFlix?

4.6 eBay has modeled worldofgood.com after early green marketplaces, positioning its activities in an environmentally friendly niche. Visit the website, describe its social mission, and describe how this fits into eBay's broader corporate mission.

4.7 With the release of the iPhone 3G and OS V2.0 in 2008, Apple created a new ecosystem or market for mobile software developers to compete and succeed in. Many iPhone developers made loud proclamations of early success. By 2009, over 30,000 separate iPhone Apps became available for iPhone users, presenting unique challenges to new iPhone developers. Using the competitive concepts and frameworks in this chapter, describe (a) the industry and context for a new firm entering into the iPhone App market, (b) how a sustainable competitive advantage could be built given this market's very low entry costs, and (c) competitive tactics that could match well to the unique nature of this market.

4.8 Identify a technology company that incorporated more than 100 years ago. Describe the industry and context for the firm today. Describe a significant industry and context shift for the firm in its history. Has the firm maintained a sustainable, competitive advantage in the markets it competes in? If so, how?

4.9 Many online search competitors are moving to compete in the mobile local search market. Providing location tailored information to mobile phones is expected to be a large opportunity for both wireless carriers and local advertisers. Select one of these mobile local search companies and create a value network for this company (e.g., Figure 4.6).

VENTURE CHALLENGE

1. Develop a SWOT analysis using the format of Table 4.4.
2. Select your strategic approach from Table 4.6.
3. Create a partnership strategy as described in Section 4.6.
4. Describe your strategy in one or two sentences that could be circulated to your employees and allies.
5. Why and how will your venture be socially responsible?

CHAPTER 5

Innovation Strategies

There's a better way to do it. Find it!
Thomas Edison

CHAPTER OUTLINE

How can an entrepreneur build an effective strategy based on innovation that will lead to a sound technology venture?

Many people believe that those who are quick to act will win the race while the slow and deliberate will trail behind. The decision to be the first mover needs to be addressed by all entrepreneurs. Using an idealized model of window of opportunity, the entrepreneur can decide when to act. The entrepreneur needs to maintain a sense of urgency but avoid being too early or too late to market. Entrepreneurs also seek to build an innovation strategy that involves new technologies, ideas, and creativity, which lead to invention and ultimately commercialization. An innovation strategy is part of most new firms' road map to success. A firm that encourages creativity and inventiveness can create the ingredients of sustained innovation. ■

5.1 First Movers Versus Followers

Many entrepreneurs believe that the quick survive while the slow struggle. The firm that leads the way with a new product or into a new market expects to lock in a competitive advantage that ensures superior profits over the long run. In this section, we consider the circumstances in which a pioneer may benefit from being a first mover. A **first-mover advantage** is the gain that a firm attains when it is first to market a new product or enter a new market.

We will describe the industries that a new venture enters as mature, growing, or emergent, as noted in Table 5.1. **Emergent industries** are newly created or newly recreated industries formed by product, customer, or context changes [Barney, 2002]. **Mature industries** have slow revenue growth, high stability, and intense competitiveness. **Growing industries** exhibit moderate revenue growth and have moderate stability and uncertainty. New technology ventures often start in uncertain, emergent industries.

The pioneering, first-mover firm has to bear the costs of promoting and establishing a product, including the potentially high costs of educating customers and suppliers. Furthermore, due to the high uncertainty of emergent markets, it is subject to potential mistakes in product, strategy, and execution. The follower firm can learn from the pioneer's mistakes and exploit the market potential created by the pioneer. Some firms successfully exploit a **follower strategy.**

Early entrants (second or third movers) into an emergent industry can also benefit from the additional time to develop, commercialize, and exploit new products if they possess the resources to wait for the opportunity to materialize [Agarwal et al., 2002]. Many examples exist of new start-ups that arrived early but didn't stay long. Pets.com, Helio, and Amp'd Mobile all burned through their investment capital before attracting enough customers to sustain a business. For most start-ups, it is more like a marathon, where how fast you get out of the starting block is irrelevant.

In many cases, pioneer entrants tend to make a large and lasting impression on customers, obtaining strong brand recognition, and buyers often face high switching costs in moving their business to a later entrant. The simplest reason in favor of a first-mover strategy is the ease of recalling the first brand name

TABLE 5.1 Three types of industries and their characteristics.

	Type of industry		
Characteristics	**Mature**	**Growing**	**Emergent**
Revenue growth	Slow	Moderate	Potentially fast
Stability	High	Moderate	Low
Uncertainty	Low	Moderate	High
Industry rules	Fixed	Fluid	Unestablished
Competitiveness	High	Moderate	Low or none

in a category. However, one study found that pioneers gained significant sales advantages but incurred large cost disadvantages relative to a fast follower entrant [Boulding and Christen, 2001]. The return on investment for pioneers was less than that for followers.

Of course, many conditions exist in which a first-mover advantage may be clear and compelling. Consider a mature industry such as restaurants or grocery stores. The attainment of a strategic resource such as a superior location may warrant acting as a first mover in a geographic market segment. Starbucks, for example, wants a store on the busiest corner in a city and acts when it finds an available site. First movers with the right set of competencies and organizational practices can reap the returns from being in the right place at the right time.

If a market is insufficiently ordered or unstable, the first entry may be too early. A market is said to be stable if the requirements necessary for success will not change substantially during the period of industry development. Amazon.com entered the online bookstore market and created intellectual property and the standard for this market. However, it incurred high development costs and had its advantages challenged by a later entry, BarnesandNoble.com. Nevertheless, Amazon.com became the leader in the race by continuous innovation.

Pioneers are often said to gain a low-cost advantage from having a head start down the experience curve, which describes improvements in productivity as workers gain experience. Often these lower costs are an advantage over later entrants [Shepherd and Shanley, 1998]. New technology ventures often act as pioneers in a new or emerging industry to gain brand, cost, and switching cost advantages. The potential advantages and disadvantages of first-mover action are summarized in Table 5.2.

When both technological innovation and consumer acceptance advance rapidly, first movers may be left behind [Suarez and Lanzolla, 2005]. However, first movers may gain advantage in an evolving market if they involve customers and

TABLE 5.2 First-mover potential advantages and disadvantages.

Possible advantages	Possible disadvantages
■ Create the standard and the rules	■ Short-lived advantages disappear with competition
■ Low-cost position	■ Higher development costs
■ Create and protect intellectual property	■ Established firms circumvent or violate patents and intellectual property rights
■ Tie up strategic resources	■ Cost of attaining the resources
■ Increase switching costs for the producer	■ High uncertainty of designing the right product. If vision is wrong, then costs to switch are large
■ Increase switching costs for the customer	■ Customer is reluctant to buy when a large cost to switch may be incurred

suppliers in the innovation process [Langerak and Haltink, 2005]. New technology ventures can exploit their nimbleness and competencies to build a competitive advantage. Amazon.com built a large business in a new market (e-commerce) in spite of the existence of large retailers such as Wal-Mart and Target.

Numerous examples exist of later entrants overtaking first movers and eventually bypassing them in profitability. Superior performance comes from distinctive competencies combined with an appropriate strategy leading to a competitive advantage (see Figure 4.5). Unfortunately, the first mover can develop a strategy based on uncertain or inaccurate assumptions about the six forces (see Figure 4.3). A follower who learns from the first mover's mistakes can move quickly to catch up or pass the first mover. The first mover also suffers from uncertainty about the customer, the organizational capabilities needed, and the industry context.

However, pioneering ventures can use their lead time to build relationships among suppliers, customers, and even competitors. These relationships can build trust and brand that a follower may not easily reproduce. A first-mover advantage can usually be attained under conditions of low market and internal firm uncertainty. Regrettably, most new ventures encounter large measures of uncertainty and must weigh carefully when to enter the market [Kessler and Bierly, 2002]. Entrepreneurs should emphasize speed to market in predictable markets. In an uncertain market, the new venture can probe or test the market by trying product tests, focus groups, and other means of market probes.

A commitment is an action taken in the present that binds an organization to a future course of action. A decision to act as a first mover is usually binding and should not be taken lightly. Preemptive actions can deter potential rivals from entering but may also result in heavy, irreversible investments [Sull, 2005].

The entrepreneur considers entering a market during an estimated period of opportunity often called a window of opportunity. The first mover envisions a greater cash flow as a result of early entry, as shown in Figure 5.1. Uncertainty about the period of opportunity can erode the actual results. If the first mover misestimates the timing of the window, a less attractive cash flow curve will result.

An entrepreneur's objective is to decide when to stop searching for additional information and enter the new market so as to maximize the expected profit. With insufficient information, a firm can enter too early and incur a large cost. However, if it takes too long to gather sufficient information, the firm may lose the first-mover advantage. Entrepreneurs should stop searching for information and enter a market when they estimate that the marginal benefit of additional knowledge is less than the payoff of entry [Lévesque and Shepherd, 2004].

Being a first mover means recognizing what direction existing technologies and industries are heading before competitors do. Today most personal computers (PCs) are built to support intense multimedia applications. In the early 1980s, most people did not recognize the role that gaming would play in the development of the PC. Chong-Moon Lee founded Diamond Multimedia Systems in 1982 to supply PC products such as color graphic and acceleration add-on boards. They significantly enhanced consumers' ability to play high-quality games on their computers. Eventually, Diamond's first-mover strategy

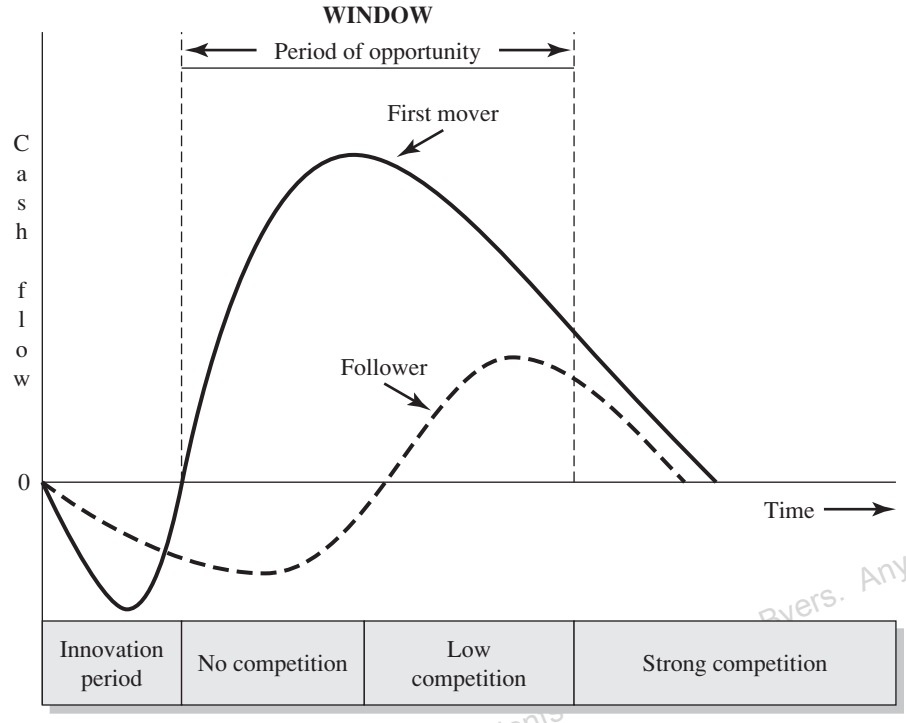


FIGURE 5.1 Expected first mover advantage and the concept of a window of opportunity.

and superior products captured the attention of IBM and Tandy (then the number 1 and number 2 PC makers in the world, respectively). As these companies increased the standard multimedia features on their PCs, they continued to buy Diamond products to provide a better customer experience. In 1995, Diamond went public and raised $126 million by selling 30 percent of the company. Moon had successfully identified the direction that personal computing would be going. His first-mover position and perseverance over time allowed him to leave a lasting impression on both the computer and gaming markets.

History is replete with companies that were first movers that did not succeed. The CPM operating system preceded Apple, which preceded DOS, which eventually became the early dominant operating system for the PC. Safety razors were introduced a decade before Gillette introduced its successful safety razor. The product must have the right mix of attributes and features, and must be understood as well as demanded by the customer. Early movers don't always have all the requisite characteristics. Prodigy was the first commercial e-mail system, but it received poor acceptance. The second entrant, CompuServe, was equally unsuccessful. Only later did AOL and MSN put together the right mix of attributes to succeed.

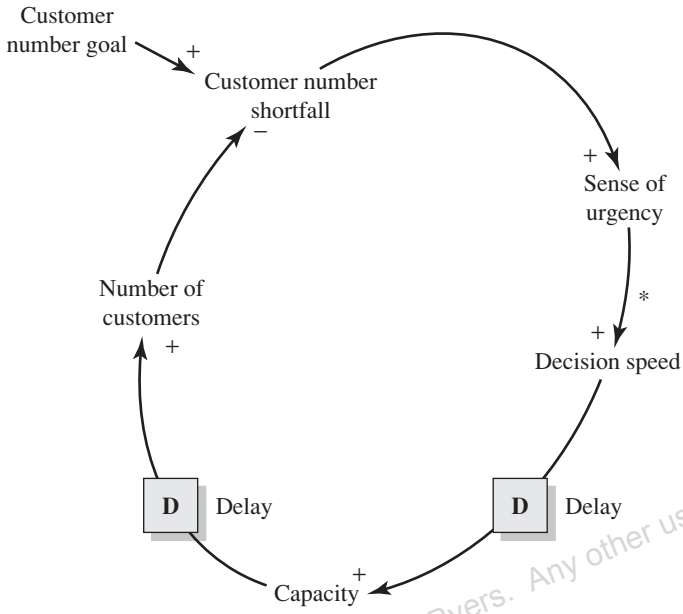


FIGURE 5.2 The sense-of-urgency cycle that can be experienced by new enterprises.

Many new ventures set a fast pace as they and their competitors enter a window of opportunity. Many start-ups exhibit a torrid pace due to a high sense of urgency, as illustrated by the causal diagram in Figure 5.2. A causal diagram can help protray causal links in a system. Variables are related by causal links, shown by arrows. For example, the link denoted with an $*$ implies that if "sense of urgency" increases, then "decision speed" increases. As the firm experiences a sense of urgency due to a shortfall of customers, it acts to build capacity to design, build, and sell its products. However, inevitable delays, D, slow down the buildup of capacity. As capacity increases, the firm expects customers to buy, but again it may experience delay as customers consider the purchase carefully. A slowdown in the growth of customer buildup results in a sales shortfall and an increasing sense of urgency [Perlow et al., 2002]. One way to decrease this unfortunate urgency cycle is to reduce the delay in capacity building and the time delay to customer purchase.

An encouraging case of good timing and entry into a marketplace is that of Google. Google entered the Internet search engine market in 1998, well after other search engines were firmly established. Larry Page and Sergey Brin, the founders of Google, met in 1995 as Ph.D. candidates at Stanford University. Over the next 18 months they collaborated to build a new search engine that ranked search query page results based not only on keywords, but also on popularity. Popularity was measured, in part, by the number of sites linked to each

Web page. The vision of the firm was "to organize the world's information." They allowed limited, less-intrusive advertising on the their site.

During late 1998, they wrote a business plan and raised $1 million in funding from family, friends, and angel investors. Working out of a garage in 1998, Google was answering 10,000 queries a day. In late 1999, it was answering three million queries each day. Google received $25 million in venture capital funding. In August 2004, Google sold about 20 million shares in an initial public offering at $85 per share. By 2009, the company had a market capitalization of $150 billion. Google's competitive advantages include its search technologies and its technical competencies. There is always a place for a new entry in a rapidly growing marketplace with a great technological innovation.

An example of identifying a window of opportunity both in a geographic market and for a technology is the founding of Baidu by Robin Li and Eric Xu. After spending several years working in the search industry, Li recognized that there was a need for a Chinese language Internet search engine in China. After Baidu was founded in 1999, the next four years were spent developing the best technology for China. With over a billion Chinese citizens, Li recognized that it was important to develop a search technology that would best serve everyone in China. In 2004, once Li felt Baidu had created the best search engine for the Chinese market, the firm shifted its focus to increasing brand awareness in China. 2005 saw an increased focus on revenue generation. Baidu's commitment to both search technology and the Chinese market helped it to become the second largest independent search engine in the world.

Machiavelli wrote in *The Prince* (XVII): "The prince ought to be slow to believe and to act, nor should he himself show fear, but proceed in a temperate manner with prudence and humanity, so that too much confidence may not make him incautious." An entrepreneur will be temperate and patient to move. On the other hand, an entrepreneur has a propensity to act. If a window of opportunity appears to be in the distant future, the entrepreneur may be wise to abandon the distant opportunity and seek one that is available and active now. If a window is about to "open", action may be prudent.

Silicon Valley Bank (SVB): Founding at Optimal Time

In the early 1980s, the deregulation of the banking industry led to a need for new innovative banks. In the same period, the Bank of America, which served the San Francisco area, was discontinuing its lending to high-tech companies. At that time, one of the founders of SVB had a series of meetings with bankers who were interested in participating in this opportunity. These factors converged, and the lead founder acted on his intuition, all of which led to the formation of Silicon Valley Bank in 1983 (see www.svb.com). Since its founding, SVB has played an important role in the early days of such successful ventures as Cisco Systems, Electronic Arts, Intuit, JDS Uniphase, KLA Tencor, and Veritas. The launch of Silicon Valley Bank is a sound example of good timing.

5.2 Imitation

Imitation is said to be the greatest form of flattery. Many important new ventures have been based on the replication or modification of an existing business that the entrepreneur encounters through previous employment or by chance [Bhide, 2000]. Entrepreneurs start a business because they believe they can manage the business as well or better than the example they are copying. Sam Walton opened his first Wal-Mart in Rogers, Arkansas, after making numerous trips to study discount retailers in other regions of the United States. Walton once said: "Most everything I've done, I've copied from someone else." Technologists attend trade shows and conferences and often notice competitors' new products that their firm may readily produce.

Unfortunately, most attempts to replicate excellent businesses fail [Szulanski and Winter, 2002]. The difficulty of imitation springs from the lack of deep understanding of the excellent business example. Furthermore, the transfer of the best business practices from one setting to another can be fraught with unforeseen uncertainty. Imitation by independent entrepreneurs can be difficult because when they look at the existing business, they cannot fully understand what makes it work. Thus, the best approach is to copy it in detail but recognize that quick response to customer comments will be necessary.

In 1986, Howard Schultz started his first independent effort as Il Giornale, a store modeled on his experience of Italian espresso bars. He played Italian opera in the Seattle store, and servers wore bowties. Il Giornale was set up as a stand-up bar, as is common in Italy, and it did not offer nonfat milk. Schultz had transferred the Italian coffee bar to Seattle with mixed success. People wanted chairs, and servers did not want ties. Nonfat milk quickly found its way onto the menu [Schultz, 1997].

Close copying may be the best method of imitation. It is important, however, to recognize the value of management and leadership, which is difficult to clone. A talented leader of an excellent business possesses some skills and capabilities that may be difficult to readily understand or copy.

Once the new business is up and running, customer comments can be used to adjust the business procedures to local conditions. Schultz loved the experience of Italian coffee bars but eventually adjusted his coffee café to fit Seattle's desires. Schultz was successful in adapting his Il Giornale store and ultimately created a successful system. He opened a second Seattle store after six months and a third store in Vancouver in 1987. By August 1987, Schultz arranged for his investor group to purchase all the Starbucks stores and its coffee roasting facility. He then merged his Il Giornale and Starbucks under the Starbucks name. By 2009, Starbucks had about 9,000 stores worldwide and revenues of over $9 billion.

JetBlue Airways is a good imitation of Southwest Airlines. Based on a low-cost, all-coach, point-to-point business model, JetBlue started in February 2000 with two aircraft serving New York City and Fort Lauderdale, Florida. JetBlue's

initial public offering in 2002 raised almost $150 million for expansion. JetBlue was an excellent example of sound imitation.

5.3 Creativity and Invention

Creativity leads to invention and thus to innovation. **Creativity** is the ability to use the imagination to develop new ideas, new things, or new solutions. Creative ideas flow to invention, and invention flows to innovation. Creative thinking is a core competency of most new ventures, and entrepreneurs strive to have creative people on their team. Creative ideas often arise when creative people look at established solutions, practices, or products and think of something new or different. The successful company generates cost-effective surprises [Schrage, 2001]. This firm is committed to making innovation the underlying focus of its business.

The creative enterprise is based on six resources, as shown in Table 5.3 [Sternberg et al., 1997]. To create something new, one needs knowledge of the field and of the domain of knowledge required. Domains are areas such as science, engineering, or marketing. Fields within a domain might be circuit design or market research. Wise, knowledgeable, creative people avoid being blinded or limited by their knowledge.

The intellectual ability required is the ability to see linkages between things, redefine problems, and envision and analyze possible practical solutions. Creative people use intuitive thinking that reflects in novel ways on a problem. A creative thinker is motivated to make something happen. Creative people are open to taking reasonable risks and acting when advised otherwise. Finally, the creative person understands the context of the problem and is willing to take a risk and advocate change. The person who has most of these skills is often called *intuitive;* that is, he or she has an instinctive ability to perceive or learn relationships, ideas, and solutions.

The intuitive person suspends critical and conventional thinking long enough to consider the possibility of new solutions. One method of creative discovery includes the following steps: (1) slow down to explore different ideas, (2) read about the field, but not too much, (3) look at the available

TABLE 5.3 Six resources for a creative enterprise.

- Knowledge in the required domain and fields: and knowing what is new.
- Intellectual abilities to recognize connections, redefine problems, and envision and analyze possible practical ideas and solutions.
- Inventive thinking about the problem in novel ways.
- Motivation toward action.
- Opportunity-oriented personality and openness to change.
- Contextual understanding that supports creativity and mitigates risks.

raw data, and (4) cultivate smart friends who have good intellectual skills [Paydarfar and Schwartz, 2001].

Creative thinking involves divergent thinking, which is the ability to see the differences among various data and events. Creativity involves the ability to synthesize, working through information to come up with combinations that are new and useful [Florida, 2002]. Incubation of the issues and time to reflect are important steps to creativity. One process of creative thinking is shown in Figure 5.3. It starts with a description of a problem and rests for a period of incubation. Then, intuitive brainstorming leads to good insights and ideas that can be evaluated and tested. Finally, a prototype is built and shown to the potential customer. This may lead to a reframing of the question or problem and a second cycle through the process. An iterative process around the loop is followed until the prototype product solves the problem. Often, the creative process is collaborative as shown in Figure 5.3. The customer-firm interaction is the locus of value co-creation [Prahalad and Ramaswamy, 2004].

It is also useful to think of the innovation process as involving multiple personas, each with their own skills and points of view. The first three personas occupy learning roles: the *anthropologist* observes behaviors and develops a deep understanding of how people interact with products, services, and each other; the *experimenter* prototypes new ideas continuously; and the

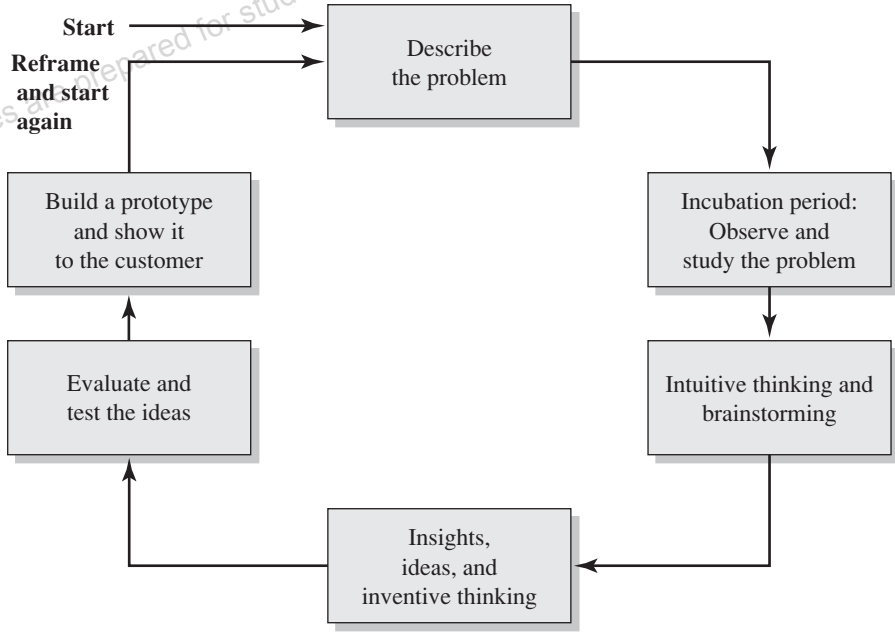


FIGURE 5.3 Creativity process.

cross-pollinator explores other industries and settings and borrows relevant ideas from them. The next three personas occupy organizing roles: the *hurdler* develops a knack for overcoming and outsmarting potential obstacles; the *collaborator* helps to bring diverse groups together; and the *director* gathers and inspires the team. The last four personas occupy building roles: the *experience architect* designs compelling experiences that go beyond mere functionality; the *set designer* transforms physical environments to facilitate the work of innovation team members; the *caregiver* anticipates and attends to customer needs; and the *storyteller* conveys a compelling narrative about the project [Kelley and Littman, 2005].

Managing for creativity can clash with rational management [Sutton, 2001]. Organizing for creativity can be different than organizing for routine work [Freeman and Engel, 2007]. One way to spur creativity is to find new uses for old materials, products, or concepts. In 1954, Kay Zufall was looking for new things for children to do. She didn't like the modeling clay sold for children because it was too stiff. However, her brother-in-law made a doughy mixture for cleaning wallpaper. Zufall tried it as a modeling medium and discovered it was soft and easy to mold and cut up. She and her brother-in-law reformulated it as a safe and colorful product for children, and they came up with the name: PlayDoh [Sutton, 2002].

All firms need a culture that sustains a creative process that enables the team members to engage and interact with ideas and new solutions. Apple was the first to develop the Newton personal digital assistant (PDA) with handwriting recognition software. In practice, few people were willing to wait for the Newton to slowly learn to recognize their handwriting. The Palm used a Graffiti interface and succeeded in capturing the market. Palm recognized that it was much easier to let humans learn to standardize their script than it was to develop software that enabled a computer to recognize all possible script.

A natural conflict exists between creatively generating ideas and inventions and implementing them. Creativity leads to new inventions and ideas. Bringing these inventions to market, however, takes routine processes. The forces of creativity and process can conflict or interact, depending on the firm's culture. Creativity flourishes when companies hire creative people, invest resources in risky projects, and get their workers to critique the ideas. These unconventional practices work because they make companies vary their thinking, see old things in new ways, and break from the past.

Rules and policies stifle creativity, and undisciplined thinking undermines routine manufacturing processes. The conflict is between managing for replication and managing for creativity. A small, emerging firm can accommodate both tendencies within it. As a firm grows, it needs to build a culture that reinforces the best qualities of creativity as well as efficient execution of its business processes [Brown, 2001].

Creativity can be seen as the ability to link together two seemingly unrelated ideas or concepts. Many ideas ignite in a free-form environment where

people have capabilities and self-confidence. Mixing creative people in unexpected ways to unleash new ideas pays off. Creating new methods, products, or business models requires a powerful vision showing people what the problems are and how to resolve them. Compelling dramatic portrayals or visualizations can help people to see and feel new opportunities [Kotter and Cohen, 2002].

5.4 Types and Sources of Innovation

Innovation is based on teamwork and creativity, and is defined as invention that has produced economic value in the marketplace. Innovation is based on the commercialization of new technology. An innovation can include new products, new processes, new services, and new ways of doing business.

There are several different types of innovation, as illustrated in Figure 5.4. **Incremental innovation** is characterized by faster, better, and/or cheaper versions of existing products. Thus, they take an existing idea and creatively expand on it. To be successful, the incremental innovator must understand specific customer needs that are unmet by current offerings. For example, portable, battery-driven radios have been used since the 1950s. But, Trevor Bayles saw an opportunity to bring information to remote Africa by creating a windup spring- and dynamo-powered radio. Twenty-five seconds of winding gives the user one hour of listening. Bay Gen in Cape Town, South Africa, now manufactures more than 60,000 of these radios a month [Handy, 1999].

Like incremental innovation, architectural innovation leaves core design concepts untouched. But, **architectural innovation** changes the way in which components of a product are linked together. Thus, the components remain unchanged, but the architecture of module connection is the innovation. (The overall architecture of the product describes how the components will work together.) The essence of an architectural innovation is the reconfiguration of an established system to link together existing components in

Linkages between modules	**Basic design concepts:** Reinforced	**Basic design concepts:** Overturned
Unchanged	Incremental innovation ("faster, better, cheaper")	Component or modular innovation
Changed	Architectural innovation	Radical or disruptive innovation ("brave new world")

FIGURE 5.4 Four types of innovation.

a new way [Henderson and Clark, 1990]. By contrast, **modular innovation** is focused on the innovation of new components and modules. But, it does not disrupt the linkages between modules.

Finally, **radical innovation** or **disruptive innovation** uses new modules and new architecture to create new products. The Internet is an example of a network system with new modules and new architecture – a radical or disruptive innovation. Disruptive innovation transforms the relationship between customer and supplier, restructures markets, displaces current products, and often creates new product categories [Leifer et al., 2000]. Disruptive products also introduce a new value proposition [Christensen et al., 2004]. For example, e-mail is an application on the Internet that is a disruptive application (often called a "killer app"). It is e-mail that makes the Internet so widely used.

The iPod—A Disruptive Innovation

The iPod was introduced in 2001 with an overall performance below that required, as illustrated in Figure 5.7. Eventually, the introduction of the iTunes store enabled the iPod to succeed. The iPod became a music business, not a computer business. The online music business took off on the positive cycle illustrated in Figure 5.5. The size, charm, and elegance of the iPod device facilitated a rapid growth of the business. Excellent portability and easy-to-use controls also were a positive factor for success. In a way, the iPod became a modern, personal jukebox. The iPod was a significant disruptive innovation.

An example of a disruptive application for the personal computer is spreadsheet software. VisiCalc, created in 1979, was the first electronic spreadsheet that helped make the personal computers widely useful. Other good examples include the invention of the "800" number toll-free telephone call by AT&T and the development of the CT scanner for medical imaging, which combined X-ray technology with computer technology [Adner and Levinthal, 2002]. These types of disruptive applications bring significant value to a product and cause an industry to grow exponentially. Entrepreneurs need to discern a possible disruptive application for their start-up firm's product.

In the search for disruptive applications, people often look for attributes that will attract users to a new product. Another approach is to recognize that customers "hire" a product or service to get a job done. Home Depot and Lowe's are organized around jobs to be done [Christensen and Raynor, 2003]. Customers become aware of needing to get something done or fix some problem and set out to hire or engage a product or service that can meet their need. Customers will pay a significant premium for products that do a job well.

Geothermal Power — A Disruptive Application

A technology called engineered geothermal systems (EGS) offers a way to harness the heat trapped in the ground. EGS involves drilling two parallel wells into the earth. Water is forced down one well and steam emerges from the other after flowing through the hot rocks underground. The steam is used to power a generator that makes electricity. Unlike solar or wind power, which depend on climate conditions, geothermal hotspots are able to provide consistent power generation. The Phillipines is a world leader in ESG. The country gets nearly a quarter of its electricity from underground heat. At current levels of energy consumption, the earth under the United States could power the country for 2,000 years [Economist, 2008]. With rising fossil fuel costs and improved technology, geothermal power is growing in potential and could become a disruptive innovation.

Sources of innovation for new ventures include research laboratories, independent inventors, and universities [Branscomb et al., 1999]. In many areas of science and technology, universities can be an especially important source of innovation. Professors and other university researchers are responsible for much cutting-edge research. Since academic research typically is not driven by direct market needs, however, a major challenge in the commercialization of university breakthroughs lies in the need to move this research from lab prototypes and concepts into full working models that can be manufactured reliably at a reasonable cost [Jensen and Thursby, 2001]. To get the most benefit from a relationship with a university, a new venture should take a long-term view and imagine a partnership focused on both technical and strategic issues. When companies take a transactional approach to the relationship, attempting to pick technologies, sign a contract, and quickly commercialize them, they are likely to fail [Wright, 2008]. By contrast, when an inventor stays involved with product development as it moves from the university to a start-up, the chances of success increase dramatically [Thursby and Thursby, 2004]. University-sourced innovations also present special legal challenges, which we discuss in Chapter 10.

Another source of innovation is the ultimate customer. But, unfortunately, customers cannot always say what they want. For example, many students will say they want more detailed and complete information in their textbooks, when they actually want worked examples that will help them pass an exam. Akio Marita, the founder of Sony, asked his engineers to design a small portable radio and cassette player that would provide good audio quality and be attached to a person's head. No customer was asking for this product, yet eventually, the Sony Walkman became one of the twentieth century's disruptive applications of miniaturized electronics. In a capitalist economy, success is the ability to anticipate and meet the difficult-to-anticipate

needs and wants of customers, and the most successful entrepreneurs are those who do this best.

Moreover, most customers have limited skills in predicting new products. They are best at reacting to a potential product and describing the outcomes they desire [Ulwick, 2002]. Customers are best at describing their experiences but limited in describing future needs. Who knew in advance that people wanted the Internet or electric-hybrid cars? For this reason, it is critical to observe potential customers to learn firsthand about their problems and needs. In fact, customers can be engaged to co-create valuable products and services, enabling a firm to create personalized experiences and customized solutions [Prahalad and Krishnan, 2008].

IDEO's Philosophy on Innovation

Successful innovation may require helping customers understand what it is they would like to see in a new product. As Tom Kelley puts it in *The Art of Innovation* [2001]:

> Your customers may lack the vocabulary or the palate to explain what's wrong and especially what's missing. Companies shouldn't ask them to. This is particularly true of new-to-the-world products or services. A user of a new type of remote control may not be able to recognize that it has too many buttons. Inexperienced computer users may not be able to explain that your Website lacks navigational clues. And they shouldn't have to. We saw this firsthand when a software company asked us to find out how users would react to one of their new applications. We set up a few computers and observed people struggling with the program. More than a couple were having a terrible time, grimacing and sighing audibly as they fumbled with the keyboard and mouse. But in exit interviews, the software company was given a different story. Those same people swore that they'd had no trouble with the new application and couldn't imagine a single improvement.

Another danger is the common practice of listening to the recommendations of a group of customers called **lead users** (sometimes called early adopters), who have an advanced understanding of a product and are experts in its use. Lead users can offer product ideas, but since they are not average users, their recommendations may have limited appeal. A good approach is to ask users what results or outcomes they want to see in doing their job using your product. Lead users can be very helpful at identifying valuable solutions. The process of innovation begins with identifying the outcomes customers want to achieve; it ends in the creation of items they will buy. One method is to ask potential customers to describe their typical day. They may reveal an important gap and a potential need. Many firms find new innovation from their

customers (users) particularly in the software industry and with physical products. Lead users who are ahead on marketplace trends can provide innovations to their suppliers [von Hippel, 2005].

Lead users often are part of technical communities. These technical communities play a crucial role in helping new enterprises to develop and deploy innovations [West and O'Mahony, 2008]. Firms benefit from participating in open communities by gathering information on potential alliances, identifying new opportunities, and sharing work and risk. One example is the open source software development community. Individual members of such a community share common goals but not a common employer. Firms sponsoring an open source community are said to have an open source strategy. Examples are the Mozilla and Linux communities. An **open source innovation** community may be defined as a collection of many firms and individuals collaborating to develop and deploy an innovation. These communities share a common goal and an agreed-to governance system.

Benefits of open source community projects include shared goals, skills, resources, and ideas. These communities may be autonomous or sponsored by a firm. Furthermore, such communities offer the benefit of transparency of developments and ready accessibility to shared knowledge. One goal is to build modular products that can be readily accessed and utilized by all members. Governance of open source communities is established in several forms to give members rights and responsibilities. Firms include nonprofit, member, and sponsored structures.

Effective open source organizations enable new ventures to build on the ideas of others to create new innovations Murray and O'Mahony, 2008. The sharing process enables knowledge to be reused, recombined, and accumulated. This process supports the flow of innovation and progress. The process needs to provide rewards and incentives to community members in order to flourish. Cumulative innovation is enabled by ready access, disclosure, and incentives associated with community activities.

One example of a good open source effort is the response of states of the United States in monitoring and tracking infectious diseases [Kingsbury, 2008]. A new venture, called Collaborative Software Initiative (CSI), based in Portland, Oregon, was created to solve this tracking problem. A collaborative solution is better than 50 independent solutions. The CSI software is shared across all states. Another example is Wikipedia, a free online encyclopedia that anyone can edit. It is a good case of the mass collaboration of peers. Another example is YouTube [Tapscott and Williams, 2008].

5.5 Technology and Innovation Strategy

Most inventions are never actually commercialized. Only about 6 percent of inventions developed by independent inventors actually reach a market [Astebro, 1998]. In established firms, the success rate is about four times as high, which still means that three-quarters of these inventions are never

commercialized. Given this low success rate, it is critical for entrepreneurs to have a sound innovation strategy.

It is often a long road from invention to commercialization. Chester Carlson developed the photocopier process—converting an image into a pattern of electrostatic charges that attract a powdered ink—in his kitchen. He patented the process in 1942. After years of little interest from established companies, he obtained help from the Battelle Institute. Then the Haloid Company purchased a license in 1946. Haloid, which became Xerox, successfully demonstrated a working product in 1949. In 1960, Haloid Xerox introduced the first successful office copier, the Xerox 914.

Schumpeter asserted that the process by which independent entrepreneurs created inventions to produce new goods, services, raw materials, and organizing methods is central to understanding business organization, the process of technical change, and economic growth. An innovation strategy rests on the competencies and knowledge of the new firm. Continual product and process innovation can enable the firm to maintain a strategic advantage. Figure 5.5 illustrates the innovation and competition cycle between firms. Competitors create innovations and offer new value to customers, fueling demand and sales and increasing the innovator's market share. The struggle is for each competitor to keep up in this innovation cycle.

While inventors can license or sell technological opportunities to others, the creation of new firms is an important mechanism through which entrepreneurs use technology to bring new products, processes, and ways of organizing into existence. Three factors influence the decision to exploit an independent invention through firm creation: the interests of the entrepreneurial team, the characteristics of the industry in which the invention would

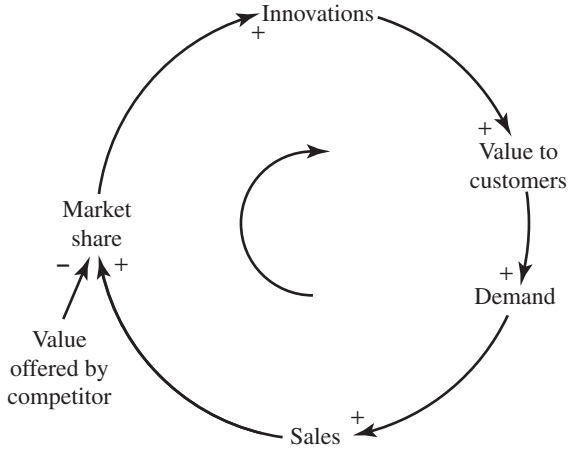


FIGURE 5.5 Innovation and competition cycle for market share.

be exploited, and the characteristics of the invention itself. We have discussed the first two of these factors in Chapters 1 through 4. Of course, the entrepreneurial team must be interested in the opportunity to be solved by the invention, and it must be satisfied that the industry will welcome and support the commercialized invention. In this section, we will consider the characteristics of the invention itself.

Three dimensions of technological inventions impact the probability that they will be commercialized through a new firm formation: importance, radicalness, and patent scope [Shane, 2001]. *Importance* reflects the magnitude of the economic value of an invention. The importance of an invention should increase the likelihood that a new firm will be founded to commercialize it because more important inventions have higher economic value and thus payoff to the entrepreneurs. Many inventions have limited commercial value and thus are not attractive to the entrepreneur. A critical determinant of an invention's importance is whether or not it addresses a real need. For example, if an invention makes it easier to do something that customers were not trying to do in the first place, it will fail [Christensen, 2002]. Thus, a "build it and they will come" innovation strategy will most likely fail.

Radicalness measures the degree to which an invention, regardless of economic value, differs from previous inventions in the field. Radical inventions have the potential, therefore, to be disruptive innovations. The radicalness of an invention is a reflection of the potential market effect of the commercialized invention. Radical technologies destroy the capabilities of existing firms because they depend on new capabilities and resources. Finally, *patent scope* describes the breadth of intellectual property protection for the invention. These three dimensions of likelihood of commercialization are listed in Table 5.4.

Dean Kamen, the holder of more than 440 patents, is one of the well-known inventors of the past three decades. He invented devices for infant care, for insulin delivery to diabetics, and for replacing the wheelchair [Brown, 2002]. Kamen invented the Segway Human Transporter in 2001. It is an electric scooterlike device. Gyroscopes inside the base platform make the scooter highly stable and self-balancing. There is no brake handle,

TABLE 5.4 Factors that influence the entrepreneur to exploit an independent invention.

1. Business interests, capabilities, and experiences of the entrepreneurial team
2. Characteristics of the industry in which the invention will be exploited
3. Characteristics of the invention:
a. Importance of the invention: Economic value and potential payoff
b. Radicalness of the invention: Differentiation of the invention from its predecessors
c. Breadth of patent protection of the intellectual property

engine, throttle, or gearshift. Users lean forward to go forward and backward to reverse direction. The inventor says the Segway can traverse ice, snow, or even large rocks. Only time will tell us the extent of this invention's importance.

We can portray the new business formation process for an invention as shown in Figure 5.6. Using this process to review the potential of the Segway Human Transporter, one can obtain different conclusions for the various proposed uses: postal service, warehouse workers, or urban dwellers. Perhaps the best application for this device is not yet named.

The difficulty with deciding whether to proceed to commercialize an invention can depend, especially, on the radicalness of the invention. Disruptive or radical innovations introduce a set of attributes to a marketplace different from the ones that mainstream customers historically have valued, and the products often initially perform unfavorably along one or two dimensions

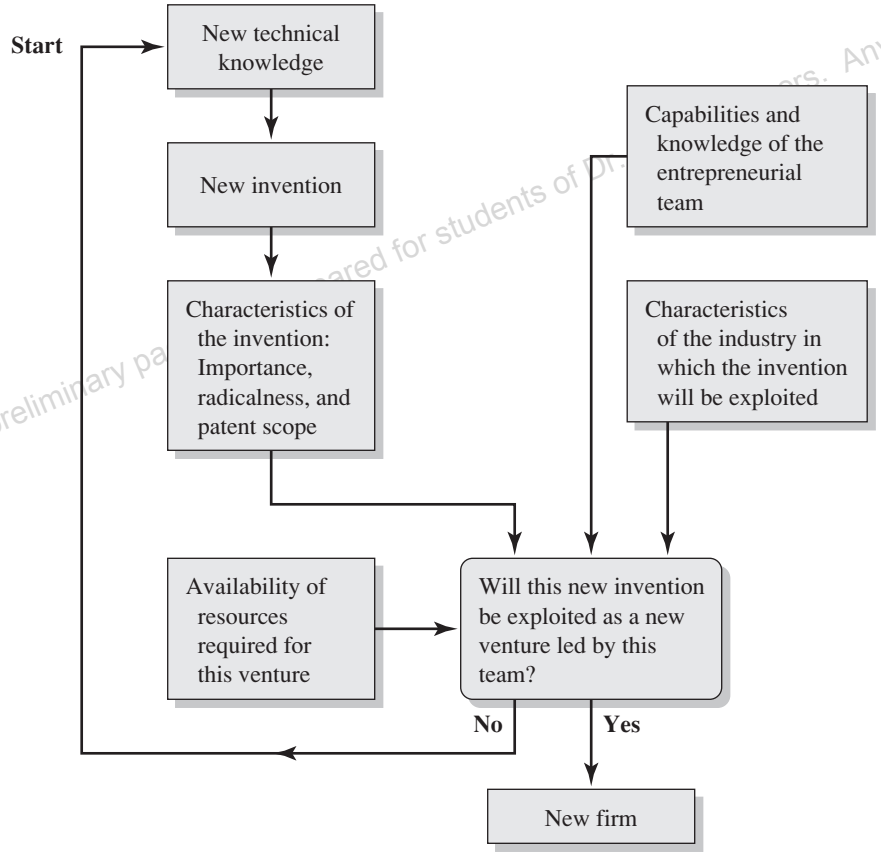


FIGURE 5.6 New business formation process for an invention.

of performance that are particularly important to those customers. As a result, mainstream customers are unwilling or unable to use disruptive products in applications they know and understand. At first, therefore, disruptive innovations tend to be used and valued only in new uncertain markets or applications.

Often the disruptive technology will not immediately serve a mainstream market, as shown in Figure 5.7. It will initially serve a niche market but will eventually enter the low end of the range of the mainstream market, as shown in Figure 5.7. For example, consider voice recognition software. The current performance of computer software for voice recognition is not always adequate for high-accuracy speaking (dictating) of documents for typing them; this might require 95 percent accuracy. Undoubtedly, there are many less-demanding uses for voice recognition software, such as voice-generated e-mails, customer service by telephone, or chat room messages. Thus, this innovation has entered the low end of the range of required performance and is progressing upward toward wider application.

Consider the disruptive innovation of U.S. discount stores in the 1960s. The increased mobility of shoppers enabled discount stores such as Kmart to select locations at the edge of town, reducing department stores' competitive advantage of prime city-center locations. The discount store had a new innovative business model: low-cost, high-unit volume and turnover provided at convenient suburban locations. It executed a trajectory from low-cost hard goods to low-cost hard and soft goods, and entered the mass markets in the 1970s and 1980s. Today, Target and Wal-Mart are in the center of the mass

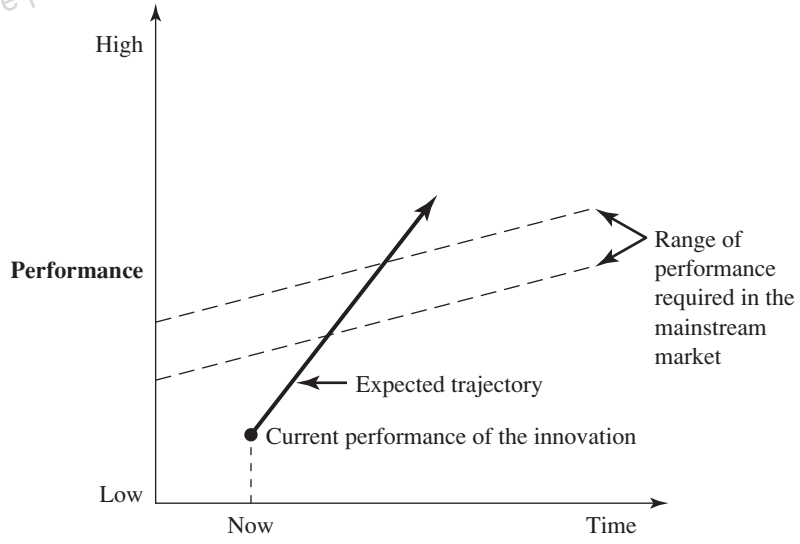


FIGURE 5.7 Expected trajectory of a disruptive innovation.

market. A recent disruptive challenge in the retail industry was Amazon.com, which appeared originally as an online bookstore but rapidly migrated toward becoming an online department store. Disruptive innovations, therefore, begin by addressing niche markets. With the right resources and capabilities, a new firm can satisfy initial needs in these markets, leveraging this early success toward mainstream dominance.

5.6 New Technology Ventures

Often, a new technology becomes available to an entrepreneur, but an economic application of the technology is not obvious. This new technology usually becomes available due to scientific discoveries or a new invention. Entrepreneurs find that this new technology may offer myriad opportunities for new ventures. However, it is unclear what, if any, application will be economically viable. Often, a new technology can be characterized as a solution looking for a problem. Neither the first companies to use the technology nor the companies with the best technology necessarily win. Instead, the firms that find the right application for the technology succeed [Balachandra et al., 2004].

The elements of an attractive innovation strategy are provided in Table 5.5. Any new venture should have a defined customer, one or two key benefits, a short period to payback, and a proprietary advantage. Finally, the new venture team must possess the necessary core competencies to exploit the new technology.

One way of describing the potential applications is to use the model shown in Table 5.6. The new technology is described briefly, and the key assumptions are listed. Then, the core competencies required for the venture are described. Finally, the possible applications market challenges are noted. Table 5.6 shows the summary of two fictional ventures. The Rotary Engine Inc. example illustrates an attractive new technology venture for vehicle engines, marine engines, appliances, and recreational vehicles. The market challenges are listed, and an attempt is made to fund the best application that will satisfy the required elements of an attractive innovation strategy.

A second example of a new technology is Fuel Cell Inc. Fuel cell technologies have been of great interest over the past decade. However, an

TABLE 5.5 Elements of an attractive innovation strategy.

- Well-defined customer
- Key customer benefit that is measurable in dollars
- Short period until economic payback and positive cash flow
- High benefit-to-price ratio for the customer
- Proprietary advantage that can be maintained or defended
- Core competencies required to exploit the new technology present or available to the new venture
- Access to the necessary resources

TABLE 5.6 Two potential new technology ventures.

Potential venture	Rotary Engine Inc.	Fuel Cell Inc.
Technology	Advanced rotary gasoline engine technology	Hydrogen fuel cell technology
Key assumptions and benefits	Improved engine efficiency and reduced pollution	Pollution reduced to near zero
Core competencies required	Engine design and manufacture	Fuel cell design and manufacture
Potential applications	1. Automobiles 2. Marine (ships) 3. Small appliances such as lawn mowers 4. Snowmobiles and off-road vehicles	1. Automobiles 2. Small, local electric generators 3. Battery replacements 4. Marine (ships)
Market challenges	1. Limited acceptance of rotary engines by customer 2. Lack of service knowledge for rotary engines 3. Benefits may be unclear to the customer	1. Limited infrastructure for hydrogen fuel cells 2. Benefits unclear to customer 3. Reliability of fuel cells is unproven

economic application is not yet proven. With the lack of supporting infrastructure, fuel cells have limited automobile applications. On the other hand, fuel cells as energy storage devices serving as battery replacements may be viable soon.

Examples of new technologies that eventually found attractive economic applications include semiconductors, genomics, stents, and wireless telephony. All these technologies eventually traversed the four steps necessary for a favorable technology innovation, as shown in Figure 5.8.

Any new attractive technology has to be feasible and manufacturable, and provide valued performance. With a sound business model and strategy, the new technology venture strives to achieve profitability in a reasonably short period.

Perhaps the greatest challenge is to develop an innovation that replaces fossil fuels [Carr, 2008]. The challenge is to find a low-cost, high-energy renewable fuel. Examples include wind, geothermal, waves, biomass, and solar technologies. These innovations must be effective, consistent, sustainable, and low cost. Solving global warming and creating green technologies will challenge innovators to develop economic innovations that can be brought to market and enable significant growth of use and scale [Krupp and Horn, 2008].

A model of a technology innovation process is shown in Figure 5.9 using the introduction of electric refrigeration as an illustration. By the late nineteenth

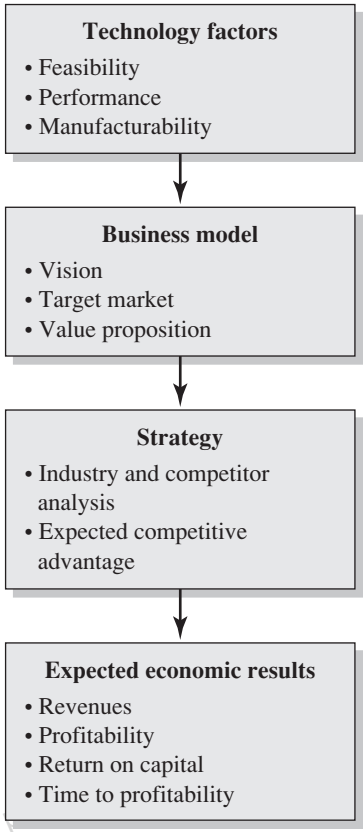


FIGURE 5.8 Four steps to achieve a favorable technology innovation.

century, electric power, electric motors, and refrigeration science were available. With the creation of the electric refrigerator [widely available by 1915], a totally new industry was created by a discontinuous innovation. The innovation model shown in Figure 5.9 can be used to illustrate new technology applications introduced today.

Technology entrepreneurs bring together the technical world and the business world in a profitable way. Entrepreneurship is a fundamental driver of the technological innovation process [Burgelman et al., 2004]. In summary, technology entrepreneurship is about the creation of a new business enterprise that generates benefits (wealth, jobs, value, progress) for participating parties by creating unique, new arrangements of resources, including technology, to meet the needs of customers and society.

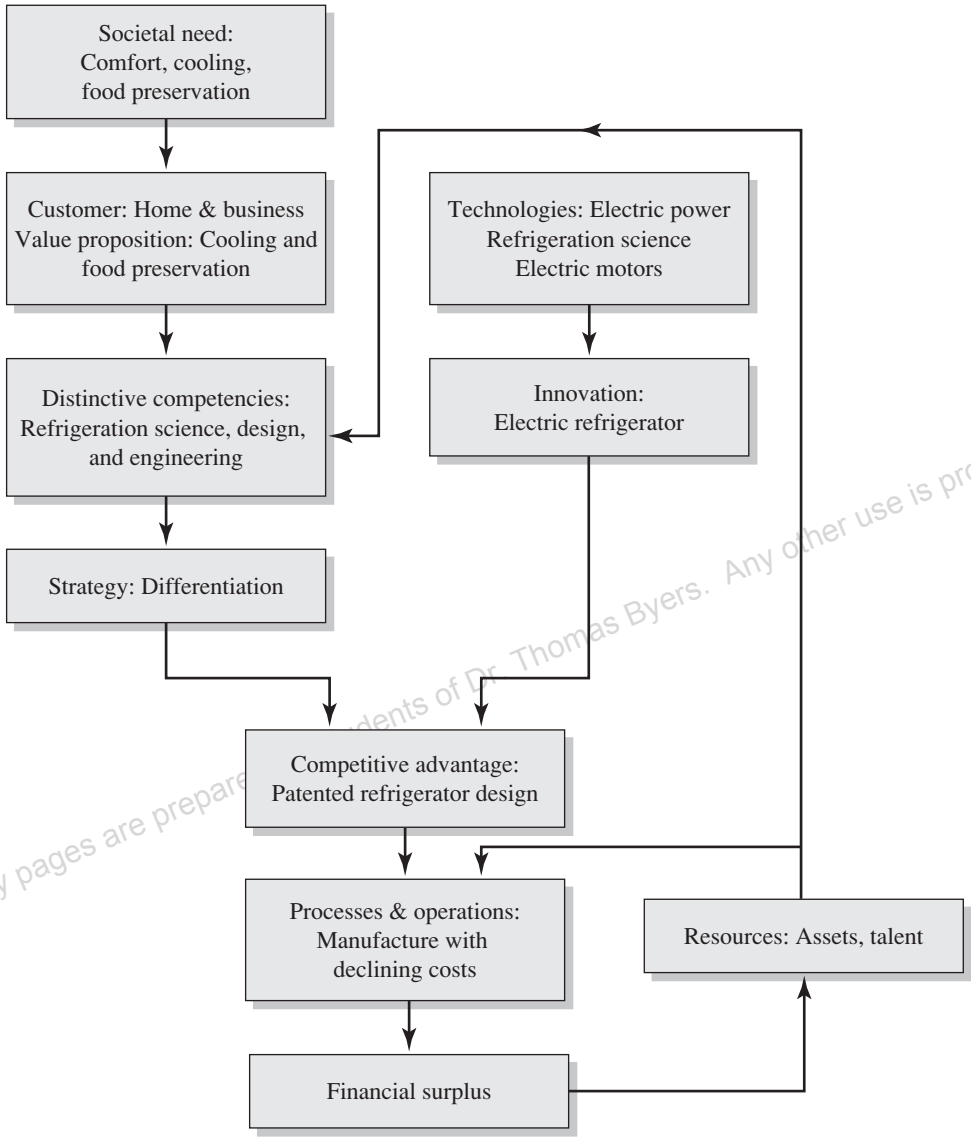


FIGURE 5.9 The introduction of electric refrigeration.

5.7 AgraQuest

Fungi and bacteria are finding their way more and more into California's groves and vineyards. Biofungicides—new products based on naturally occurring microorganisms or other plant derivatives—are bringing growers tough disease-fighting tools while making a very slight environmental impact.

Biofungicides are just one of a larger category of products known as biological pesticides, or "biopesticides." Biopesticides are pesticides derived from natural materials, including animals, plants, and bacteria. Many biofungicides are produced by fermentation, a process in which a microorganism with fungicidal properties is grown, much the same way yeasts grow in the fermentation of beer or wine.

Using a proprietary technology, each week AgraQuest researchers analyze hundreds of potential naturally occurring microbes for a novel ability to destroy or impact various undesired bacteria, fungi, insects, and nematodes, all enemies of crop production. To date, the company has screened more than 20,000 microorganisms and identified 23 that display high levels of activity against insects, nematodes, and plant pathogens. AgraQuest has selected a set of these candidates for further development.

One of the more promising discoveries that AgraQuest has licensed is a stinky fungus from Honduras that may provide farmers with a natural alternative to methyl bromide. A recent federal law requires that use of the ozone-damaging gas be eliminated, except for very limited purposes. Methyl bromide is used as a soil fumigant by growers of strawberries, tomatoes, and other vegetables that are AgraQuest's prime market.

The registration process for biopesticides and other such bioproducts through the Biopesticides and Pollution Prevention Division of the U.S. EPA's Office of Pesticide Programs tends to be shorter and more efficient than for chemical fungicides. Therefore, AgraQuest has a shorter time-to-market for a new bioproduct.

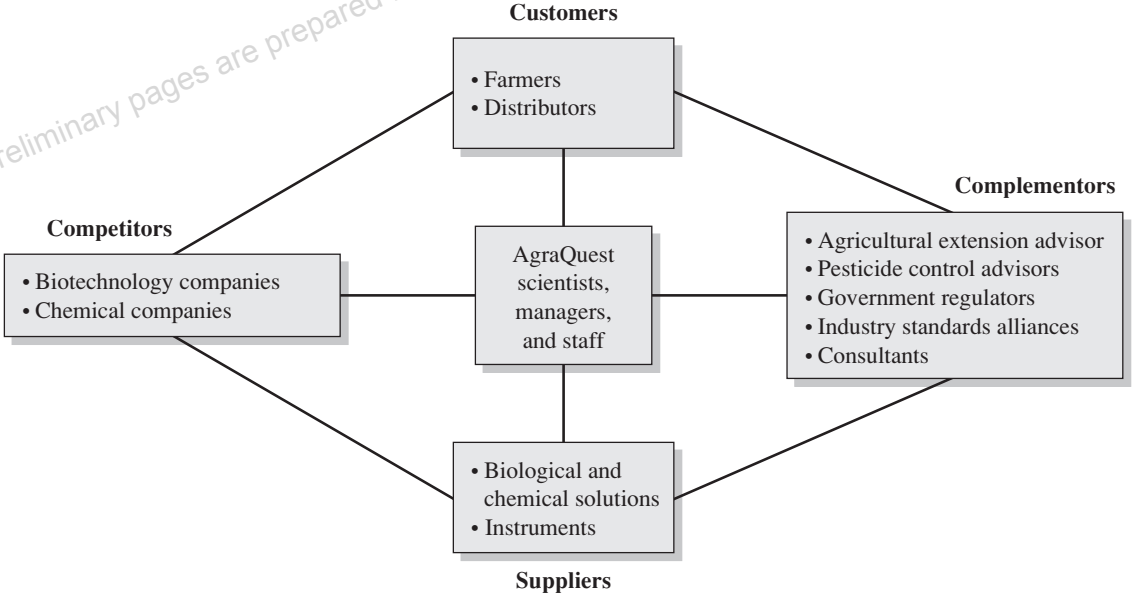


FIGURE 5.10 Value network for AgraQuest.

The biopesticide industry is only emerging and should grow over the next decade. The window of opportunity has opened, and many companies are competing for leadership. AgraQuest experiences significant delays in development and approval of products. It takes about two to three years and $6 million to get one product to market.

AgraQuest's innovation strategy is based on proprietary processes and patents. The firm holds 20 U.S. patents and 3 U.S. patent applications, along with 9 foreign patents and 95 foreign patent applications. The patents cover the microbe and its use as well as novel natural product compounds and mixtures.

AgraQuest's value network is shown in Figure 5.10. AgraQuest is dependent on its complementors to help it succeed. For example, the advice of the extension advisors and pesticide application firms is highly valued by the farmers.

5.8 Summary

Successful innovative firms strive to time their entry into markets. They balance a sense of urgency with a deliberate buildup to action. Working with partners—firms and individuals—most firms can enhance their capabilities and strengths for creativity, invention, and innovation. Almost all firms build an innovation strategy that strives to provide them with a sustainable action plan.

- A first-mover strategy can lead to significant benefits in an emerging market, but is not a guarantee of success.
- An innovation strategy creates a road map for continual commercialized invention.
- An ambitious venture can strive to design a product or service that is a disruptive application ("killer app.") that reshapes an industry.

Principle 5
An innovation strategy builds on creativity, invention, and technologies, acting within a value network, to effectively commercialize new products and services for its customers.

Video Resources

Visit http://techventures.stanford.edu to view experts discussing content from this chapter.

Three Types of Innovation	Judy Estrin	JLabs
Two Weird Ideas That Work	Robert Sutton	Stanford University
Technology as Medium, Not Content	Jesse Fink, Steve Blank	MissionPoint Capital
Navigating AgraQuest's Value Chain	Pam Marrone	AgraQuest

5.9 Exercises

5.1 Name and describe the strategies of a company that was successful as a start-up being a first mover. Contrast that with a company that was successful being a fast follower.

5.2 Select an industry of interest to you and then try to find a good candidate for imitation. Describe the opportunity and tell how you will reap the benefits of imitation.

5.3 Go to a university's website and determine if a technology licensing office exists (e.g., http://otl.stanford.edu at Stanford University). Explore its website and featured technologies. Would you consider any of the feature technologies new-venture opportunities? Does the technology licensing office encourage innovation at this university? If so, how?

5.4 An inventor brings you a new design for an electric toothbrush with an oscillating head and a tilted handle that appears to meet the American Dental Association criteria. The inventor has filed a preliminary application for a patent. Also, you have tried the brush and found it easy to use. Using the factors of Table 5.4, provide a brief review of this invention. Would you recommend proceeding with commercialization?

5.5 Determine and describe the enabling technology used by Take-Two Interactive to develop its interactive software games (www.take2games.com). Describe Take-Two Interactive's value network as described in Section 4.6.

5.6 Gentex Corporation designs and manufactures automatic-dimming automotive rearview mirrors. Its safety mirrors use sensors and electronics to detect glare from trailing approaching vehicles at night and darken accordingly (www.gentex.com). Describe the invention and technology that Gentex uses. Draw a value network as described in Section 4.6 for Gentex and name its partners.

5.7 Zebra Technologies Corporation provides bar-code labeling solutions for use in automatic identification and data collection systems (www.zebra.com). Describe the technology of Zebra in terms of the three dimensions of technological inventions: importance, radicalness, and patent scope.

5.8 The E-Stamp Corporation was first to market in 1997 with the ability to sell stamps over the Internet to consumers who print the stamps on their printers (www.estamp.com). By 2001, however, E-Stamps' 31 patents and other intellectual property were purchased by Stamps.com (www.stamps.com). Study this acquisition and determine why being first to market was not a winning strategy for E-Stamp.

VENTURE CHALLENGE

1. Describe your venture in terms of timing of entry as illustrated by Figure 5.1.
2. Describe your creative process as outlined in Figure 5.3.
3. Discuss your type of innovation as defined in Section 5.4.
4. Summarize your technology and innovation strategy.
5. Is your product or service a disruptive innovation?