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FIFTH EDITION

# PROJECT MANAGEMENT

ACHIEVING COMPETITIVE ADVANTAGE

JEFFREY K. PINTO



Pearson

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*Fifth Edition*

# PROJECT MANAGEMENT

ACHIEVING COMPETITIVE ADVANTAGE

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New York, NY

*To Mary Beth, my wife and best friend, with the most profound thanks and love for her unwavering support. And, to our children, Emily, AJ, and Joseph—three “projects” that are definitely over budget but that are performing far better than I could have hoped!*

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# PREFACE

Project management has become central to operations in industries as diverse as construction and information technology, architecture and hospitality, and engineering and new product development; therefore, this text simultaneously embraces the general principles of project management while addressing specific examples across the wide assortment of its applications. This text approaches each chapter from the perspective of both the material that is general to all disciplines and project types and that which is more specific to alternative forms of projects. One way this is accomplished is through the use of specific, discipline-based examples to illustrate general principles as well as the inclusion of cases and Project Profiles that focus on more specific topics, such as, Chapter 5's treatment of IT "death march" projects (see Box 5.1 below).

## BOX 5.1

### Project Management Research in Brief

#### Information Technology (IT) Project "Death Marches": What Is Happening Here?

Every year, billions of dollars are spent on thousands of information technology (IT) projects worldwide. With the huge emphasis on IT products and advances in software and hardware systems, it is no surprise that interest in this field is exploding. Under the circumstances, we would naturally expect that, given the importance of IT projects in both our corporate and everyday lives, we are doing a reasonably good job of implementing these critical projects, right? Unfortunately, the answer is a clear "no." In fact, IT projects have a terrible track record for delivery, as numerous studies have shown. How bad? The average IT project is likely to be 6 to 12 months *behind* schedule and 50% to 100% *over* budget. Of course, the numbers vary with the size of the project, but the results still suggest that companies should expect their IT projects to lead to wasted effort, enormous delays, burnout, and many lost weekends while laboring for success with the cards stacked the other way.

What we are referring to here are "death march" projects. The death march project is typically one in which the project is set up for failure through the demands or expectations that the company places on it, leaving the intention that the project team will pull off a miracle. The term *death march* invokes images of team members wearily trudging along mile after mile, with no possibility of successful conclusion in sight. Death march projects are defined as projects "whose parameters exceed the norm by at least 50%." In practical terms, this can mean:

- The schedule has been compressed to less than half the amount estimated by a rational estimating process (e.g., the schedule suggests it should take one year to complete the project, but top management shrinks the schedule to six months).
- The project team staffing has been reduced to half the number that normally would be assigned to a project of this size and scope (e.g., a project manager needing 10 resources is instead given only 5).
- The budget and other necessary resources are cut in half (e.g., as a result of downsizing and other cost-cutting exercises in the company, everyone is expected to "do more with less", or competitive bidding to win the contract was so intense that when the smoke cleared the company that won the project did so at such a cut-rate price that it cannot possibly hire enough people to make it work).

The result of any or all of these starting conditions is a virtual guarantee that the project will fail. The prevalence of death march projects begs the question: Why are death march projects so common, and why do they continue to occur? According to the research, there are a number of reasons:

1. Politics—the project may be the result of a power struggle between two ambitious senior executives, or it may have been set up to fail as a form of revenge upon some manager. In these cases, the project manager just gets caught in the blast zone.
2. Naïve promises made by marketing executives or inexperienced project managers—inexperience can result in all sorts of promises made, including those that are impossible to fulfill. In order to impress the boss, a new project manager may promise more than he can deliver. Marketing managers who are concerned with sales and how to improve them may think, "what's a little exaggerated promise if it closes the deal?"
3. Naïve optimism of youth—a technical hotshot who is ambitious and feeling particularly cocky one day may make exaggerated promises that quickly result in the project team getting in over its head. Optimism is no substitute for careful planning.

Students in project management classes come from a wide and diverse cross section of university majors and career tracks. Schools of health, public administration, business, architecture and the built environment, engineering, information systems, and hospitality are all adding project management courses to their catalogs in response to the demands from organizations and professional groups that see their value for students' future careers. Why has project management become a discipline of such tremendous interest and application? The simple truth is that we live in a "projectized" world. Everywhere we look, we see people engaged in project management. In fact, project management has become an integral part of practically every firm's business model.

This text takes a holistic, integrated approach to managing projects, exploring both technical and managerial challenges. It not only emphasizes individual project execution, but also provides a strategic perspective, demonstrating the means with which to manage projects at both the program and portfolio levels.

At one time, project management was almost exclusively the property of civil and construction engineering programs where it was taught in a highly quantitative, technical manner. “Master the science of project management,” we once argued, “and the ‘art’ of project management will be equally clear to you.” Project management today is a complex “management” challenge requiring not only technical skills but a broad-based set of people skills as well. Project management has become the management of technology, people, culture, stakeholders, and other diverse elements necessary to successfully complete a project. It requires knowledge of leadership, team building, conflict resolution, negotiation, and influence in equal measure with the traditional, technical skill set. Thus, this textbook broadens our focus beyond the traditional project management activities of planning and scheduling, project control, and termination, to a more general, inclusive, and, hence, more valuable perspective of the project management process.

## NEW TO THIS EDITION

### New Features

- Sustainability in Project Management
- Employability Skills
- Project Management Ethics
- MS Project 2016 Step-by-Step Tutorials
- New Project Managers in Practice Profiles
- Project Portfolio selection
- Expanded discussion of Agile project management
- Updated problems in chapters
- Updated Internet Exercises
- Expanded PMP Certification Exam sample questions
- New project management cases
- All MS Project examples and screen captures updated to MS Project 2016

### Updated Project Profiles and Cases

#### *Chapter 1: Introduction: Why Project Management?*

- Development Projects that are Transforming Africa
- President Obama Signs the Program Management Improvement and Accountability Act
- London’s Crossrail: Europe’s Largest Construction Project

#### *Chapter 2: The Organizational Context: Strategy, Structure, and Culture*

- The Airbus A-380: A Failure of Strategy?
- Electronic Arts and the Power of Strong Culture in Design Teams

#### *Chapter 3: Project Selection and Portfolio Management*

- Project Selection Procedures: A Cross-Industry Sampler

#### *Chapter 4: Leadership and the Project Manager*

- NASA Taps a Leader with the Right Stuff to Run Their Mars 2020 Project
- Leading by Example for the London Olympics—Sir John Armitt
- Brazilian Construction Giant Caught in Wide-Spread Corruption Scandal

#### *Chapter 5: Scope Management*

- Berlin’s Brandenburg Willy Brandt International Airport
- Nicaragua’s Canal and Sustainability Challenges
- Boeing’s Virtual Fence
- California’s High-Speed Rail Project
- The Expeditionary Fighting Vehicle

#### *Chapter 6: Project Team Building, Conflict, and Negotiation*

- Team Building Events – Heli-Skiing and Zombie Apocalypses
- Engineers Without Borders: Project Teams Impacting Lives

*Chapter 7: Risk Management*

- Samsung’s Galaxy Note 7 – Failure to Manage a New Product for Risk
- Japan Decommissions a \$9 Billion Nuclear Reactor that was Hardly Used
- Collapse of Shanghai Apartment Building
- The Building That Melted Cars

*Chapter 8: Cost Estimation and Budgeting*

- New York City’s Second Avenue Subway – Two Miles Completed for *Only* \$5 Billion Spent
- Sochi Olympics—What’s the Cost of National Prestige?
- The Hidden Costs of Infrastructure Projects: The Case of Building Dams

*Chapter 9: Project Scheduling: Networks, Duration Estimation, and Critical Path*

- Preparing for a Major Golf Tournament – It’s a Long Road to the First Tee
- Moving the Historic Capen House

*Chapter 10: Project Scheduling: Lagging, Crashing, and Activity Networks*

- Kiruna, Sweden – A Town on the Move!

*Chapter 11: Critical Chain Project Scheduling*

- General Electric – Using Agile Methods to Speed New Project Delivery
- Eli Lilly Pharmaceutical’s Commitment to Critical Chain Project Scheduling

*Chapter 12: Resource Management*

- Environmental Concerns and Political Leadership Impact Fossil Fuel Project Cancellations
- “First Come, First Served”: Resource Challenges for Sunrise Restoration

*Chapter 13: Project Evaluation and Control*

- U.S. Army Can’t Track Spending on its Spending Tracker Project
- Earned Value Management at Northrop Grumman
- Dear Mr. President—Please cancel our project!: The Honolulu Elevated Rail Project

*Chapter 14: Project Closeout and Termination*

- Amazon’s Golden Touch Fails with a High-Tech Gadget
- Aftermath of a “Feeding Frenzy”—Dubai and Cancelled Construction Projects
- New Jersey Kills Hudson River Tunnel Project
- The Navy Struggles to Avoid Cancellation of its Littoral Combat Ship Program

## SOLVING TEACHING AND LEARNING CHALLENGES

Projects continue to drive innovation and advances in human development globally. Evidence from businesses, government offices, public and private organizations, and volunteer groups all point to the way in which project-based work has become central to the challenges new generations of college graduates will face. Many students initially have a difficult time understanding why projects form such a central theme in their current academic undertakings and how these project challenges will continue to grow as they move into the workforce. In project management courses in business, engineering, health administration, hospitality, and science programs, the challenge faculty and students often face is to personalize these ideas to the roles their students are preparing to undertake. Moreover, one of the principal challenges of effectively teaching project management is to understand that project management duties are broad and diverse; most particularly, they require computational, software, and organizational/behavioral knowledge. Some of our students are quickly able to understand the computational elements of using mathematical models to select projects, developing schedules and networks, using Microsoft Project and other software packages, and tracking projects, while finding the “people” skills in leading a project team daunting. Alternatively, other students are comfortable with financial and managerial concepts but experience more difficulty in transitioning to statistical, software, or arithmetic challenges. The fascinating nature of project management is that it requires students to develop a mastery of both the “people” and “numbers” sides of the discipline. Short of the CEO’s office, in no other position in an organization are the duties as broad and diverse as those found in the project manager role—developing

strategies, financing, planning, budgeting, negotiating, leading, controlling, and motivating—these are all routine responsibilities of project managers.

To illustrate the computational challenges of project management, we provide many chapters, cases, and examples of how to use financial models to select a project portfolio, how to develop project networks and identify the critical path, how to use MS Project to engage its planning and tracking tools, and how to employ earned value and other methods for accurately determining the status of projects. Managerial challenges are addressed through chapters, profiles, and cases that highlight leadership, stakeholder management, team development, conflict and negotiation, ethical challenges, and project sustainability. Project management is a dynamic undertaking. We employ a simple visual device (see Figure 1.12 below) to demonstrate the manner in which technical and managerial challenges intermingle, as the project moves through its development cycle. Referring to this visual can help students understand the project life cycle and project manager duties across its development.

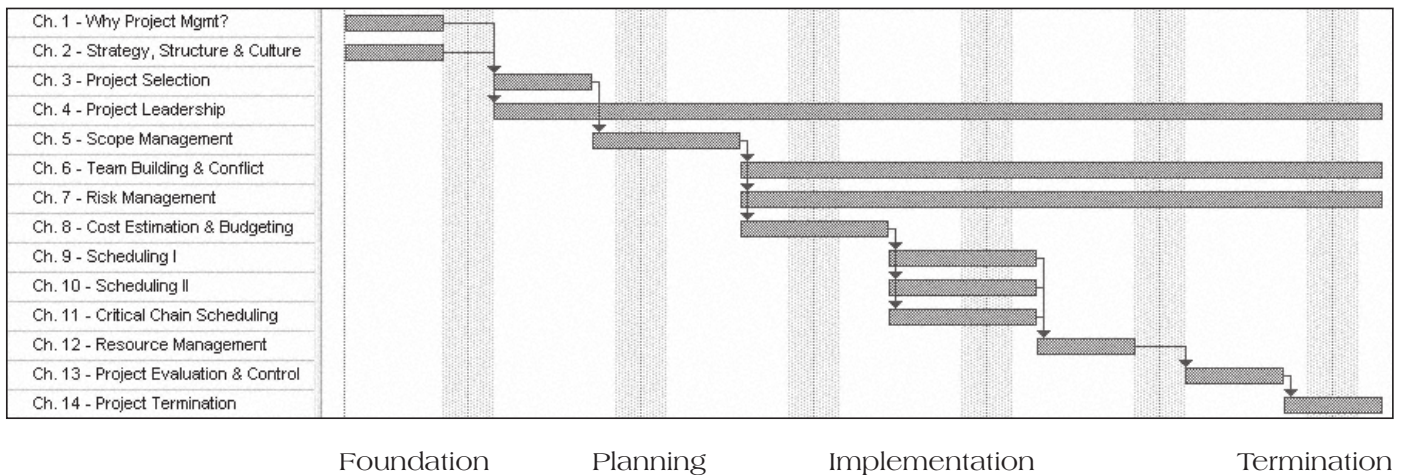


FIGURE 1.12

To support these teaching initiatives, the text employs a wide variety of pedagogical approaches, including tutorials and screen captures of Microsoft Project for scheduling and project status updating, problems, an integrated project plan to show students how to develop and plan their own projects, templates for planning and project charters, and other devices to support student learning and computational skills. Additionally, the text uses cases and profiles of current examples of projects from a wide variety of industries. Just as projects are ubiquitous across a wide variety of industries, the cases and examples in this text cover new product development, construction and infrastructure, hospitality, software and programming, as well as many other project examples. The cases and profiles were deliberately created to demonstrate the breadth of project challenges in order to reinforce for students that regardless of their undergraduate degree or career aspirations, they will be heavily involved in project-based work.

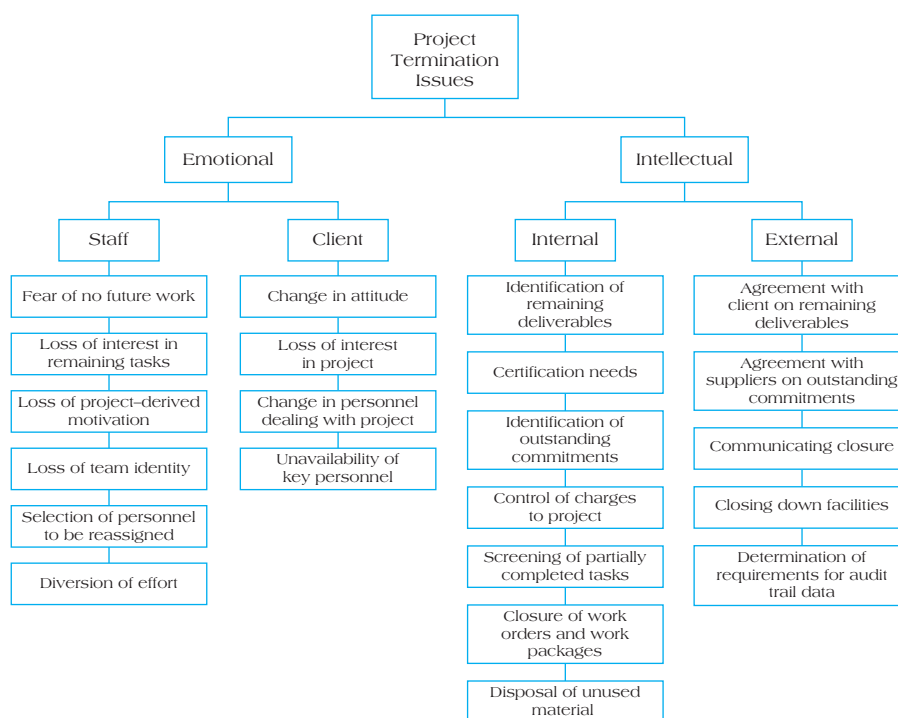


- Project Profiles**—Each chapter contains one or more Project Profiles that highlight current examples of project management in action. Some of the profiles reflect on significant achievements; others detail famous (and not-so-famous) examples of project failures. Because they cover diverse ground (IT projects, construction, new product development, and so forth), there should be at least one profile per chapter that is meaningful to the class's focus. There is a deliberate effort made to offer a combination of project success stories and project failures. While successful projects can be



instructive, we often learn far more from examining the variety of reasons why projects fail. As much as possible, these stories of success and failure are intended to match up with the chapters to which they are attached. For example, as we study the uses of projects to implement corporate strategy, it is useful to consider the current status of Airbus's A380, the massively expensive, double-decker aircraft that appears to be ripe for early cancellation because of mediocre sales.

- **Cases**—At the end of each chapter are some final cases that take specific examples of the material covered in the chapter and apply them in the alternate format of case studies. Some of the cases are fictitious, but the majority of them are based on real situations, even where aliases mask the real names of organizations. These cases include discussion questions that can be used either for homework or to facilitate classroom discussions. There are several “classic” project cases as well, highlighting some famous (and infamous) examples of projects whose experiences have shaped our understanding of the discipline and its best practices.



- **Integrated Project Exercises**—Many of the chapters include an end-of-chapter feature that is unique to this text: the opportunity to develop a detailed project plan. A very beneficial exercise in project management classes is to require students, either in teams or individually, to learn the mechanics of developing a detailed and comprehensive project plan, including scope, scheduling, risk assessment, budgeting, and cost estimation. The Integrated Project exercises afford students the opportunity to develop such a plan by assigning these activities and illustrating a completed project (ABCups, Inc.) in each chapter. Thus, students are assigned their project planning activities and have a template that helps them complete these exercises.

Lastly, this text supports the employability skills goal that Pearson actively promotes in its publications by linking to important materials and knowledge from the Project Management Institute, the world's largest professional project management association. The text uses terminology for their Project Management Body of Knowledge (PMBok), employs the PMBoK glossary of terms, and includes an expanded set of sample Project Management Professional (PMP) certification exam questions at the end of most chapters. Faculty can demonstrate that these chapters highlight critical

project management duties but also point to the professionalism opportunities from project management careers.

- **Integration with the PMBOK**—As a means to demonstrate the coverage of the critical PMBOK elements, readers will find that the chapters in this text identify and cross-list the corresponding knowledge areas from the latest, fifth edition of PMBOK. Further, all terms (including the Glossary) are taken directly from the most recent edition of the PMBOK.

**5.19** A hospital expansion is being planned for a community. As part of the scope of this project, it will be necessary to close down the access routes into the emergency room for major remodeling. However, because this is the only hospital for trauma cases within 50 miles, it is not possible to completely shut down the emergency room. The project team will have to find a means to remodel the emergency room while allowing for continuous operation of the unit. This is an example of what?

- Negotiation points with the owner
- Constraints
- Initial assumptions
- Milestone development

- **Inclusion of Sample PMP Certification Exam Questions**—The Project Management Professional (PMP) certification represents the highest standard of professional qualification for a practicing project manager and is administered by the Project Management Institute. As of 2017, there were more than 775,000 PMPs worldwide. In order to attain PMP certification, it is necessary for candidates to undergo a comprehensive exam that tests their knowledge of all components of the PMBOK. This text includes an expanded set of sample PMP certification exam questions at the end of most of the chapters, in order to give readers an idea of the types of questions typically asked on the exam and how those topics are treated in this book.

## DEVELOPING EMPLOYABILITY SKILLS

Careers in project management are in high demand, and those numbers continue to grow dramatically. Data collected in 2016 by the U.S. Bureau of Labor Statistics and the Anderson Economic Group assessed the popularity of jobs in project-based industries and concluded that there are outstanding opportunities for jobs and career growth in the discipline of project management. Moreover, it is expected that future demand for project managers will continue to grow *faster* than demand for workers in other professions. Further, this demand for trained project managers is currently expected to far outstrip the current supply of qualified individuals capable of performing these roles. This information all points to one critical conclusion: project management careers are in exceptionally high demand and are expected to remain that way for the next decade (at least, through 2027). Eleven countries studied by the Anderson Economic Group, including the United States and Canada, Brazil, Germany, China, India, and Japan, are all projecting millions of project management jobs available in the next decade, spanning a diverse set of industries, including construction, healthcare, new product development, services and hospitality, and Information Technology (IT). Finally, two critical pieces of information highlight this accelerating demand for project management professionals: first, the percentage of those in project-oriented occupations will become a larger proportion of total employment, with anticipated growth from 5.6% in 2006 to 8.3% in 2017. Second, wages in 2017 for project management-oriented professionals reflect far higher average salaries than non-project-oriented professionals, with a premium of 82% over non-project workers. Clearly, the data make a strong case that project management skills are a critical means by which students can enhance their employability.

This text reinforces Pearson's commitment to producing not only innovative educational content but ensuring that the material covered in their products addresses the critical skills that employers are looking for. As part of a recent, large-scale study, involving hundreds of respondents from universities and public and private organizations, Pearson identified a set of "employability skills," those abilities that businesses deem crucial for their new hires. These skills include: 1) communication, 2) critical thinking, 3) collaboration, 4) knowledge application and analysis, 5) business ethics and social responsibility, 6) information technology application and computer skills, and 7) data literacy. We have modeled the text material, exercises, tutorials, and case material to address each of these seven employability skills in order to provide students with the maximum advantage when transitioning from the classroom to the business enterprise. With this textbook, *Project Management: Achieving Competitive Advantage*, students receive the dual benefit of acquiring the latest information and employability skills in a discipline that is in extraordinarily high demand.

## INSTRUCTOR TEACHING RESOURCES

At the Instructor Resource Center, [www.pearsonhighered.com/irc](http://www.pearsonhighered.com/irc), instructors can easily register to gain access to a variety of instructor resources available with this text in downloadable format. If assistance is needed, our dedicated technical support team is ready to help with the media supplements that accompany this text. Visit <https://support.pearson.com/getsupport> for answers to frequently asked questions and toll-free user support phone numbers.

This program comes with the following teaching resources:

Supplements available to instructors at <a href="http://www.pearsonhighered.com/irc">www.pearsonhighered.com/irc</a>	Features of the Supplement
<b>Instructor's Solution Manual</b> authored by Jeffrey Pinto	<ul style="list-style-type: none"> <li>• Chapter-by-chapter summaries</li> <li>• Teaching outlines</li> <li>• Solutions to all questions and problems in the book</li> </ul>
<b>Test Bank</b> authored by Jennifer Morin from University of Central Florida	1400 multiple-choice, true/false, short answer, and graphing questions with these annotations: <ul style="list-style-type: none"> <li>• Difficulty level (1 for straight recall, 2 for some analysis, 3 for complex analysis)</li> <li>• Section number and name</li> <li>• Learning outcome</li> <li>• Application type</li> <li>• AACSB learning standard (Ethical Understanding and Reasoning; Analytical Thinking; Information Technology; Diverse and Multi-cultural Work; Reflective Thinking; Application of Knowledge)</li> </ul>
<b>Computerized TestGen®</b>	TestGen allows instructors to <ul style="list-style-type: none"> <li>• Customize, save, and generate classroom tests</li> <li>• Edit, add, or delete questions from the test item files</li> <li>• Analyze test results</li> <li>• Organize a database of tests and student results.</li> </ul>
<b>PowerPoint Presentations</b> authored by Jennifer Morin from University of Central Florida	Slides include all the graphs, tables, and equations in the textbook. PowerPoints meet accessibility standards for students with disabilities. Features include, but are not limited to: <ul style="list-style-type: none"> <li>• Keyboard and screen reader access</li> <li>• Alternative text for images</li> <li>• High color contrast between background and foreground colors</li> </ul>

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In acknowledging the contributions of past and present colleagues to the creation of this text, I must first convey my deepest thanks and appreciation for the 30-year association with my original mentor, Dr. Dennis Slevin of the University of Pittsburgh's Katz Graduate School of Business. My collaboration with Denny on numerous projects has been fruitful and extremely gratifying, both professionally and personally. In addition, Dr. David Cleland's friendship and partnership in several ventures has been a great source of satisfaction through the years. A frequent collaborator who has had a massive influence on my thinking and approach to understanding project management is Professor Peter W. G. Morris, lately of University College London. Working with him has been a genuine joy and constant source of inspiration. Additional mentors and colleagues who have strongly influenced my thinking include Rodney Turner, Janice Thomas, David Frame, Nuno Gil, Ralf Müller, Andrew Davies, Jonas Soderlund, Young Kwak, Rolf Lundin, Lynn Crawford, Christophe Bredillet, Graham Winch, Terry Williams, Terry Cooke-Davies, and Karlos Arto. Each of these individuals has had a profound impact on the manner in which I view, study, and write about project management. I am also grateful for the collaboration with Jennifer Morin and Gada Baz, who contributed cases to this edition of the text. I have enjoyed very much working with them and appreciate their commitment to the book.

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Finally, I wish to extend my sincere thanks to the people at Pearson for their support for the text during its development, including Neeraj Bhalla, editor, and Sugandh Juneja, content producer. I also would like to thank the Pearson editorial, production, and marketing staffs.

## FEEDBACK

The textbook team and I would appreciate hearing from you. Let us know what you think about this textbook by writing to [college.marketing@pearson.com](mailto:college.marketing@pearson.com). Please include “Feedback about Pinto” in the subject line.

If you have questions related to this product, please contact our customer service department online at <https://support.pearson.com/getsupport>.

Finally, it is important to reflect on an additional salient issue as you begin your study of project management; *most of you will be running a project long before you are given wider management responsibilities in your organizations*. Successful project managers are the lifeblood of organizations and bear the imprint of the fast track. I wish you great success!

**Jeffrey K. Pinto, Ph.D.**

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Dr. Pinto has taught and consulted widely in North America, South America, and Europe on a variety of topics, including project management, new product development, supply chain management, information systems implementation, organization development, leadership, and conflict resolution.

# 1



## Introduction

### Why Project Management?

#### Chapter Objectives

After completing this chapter, you should be able to:

- 1.1 Understand why project management is becoming such a powerful and popular practice in business.
- 1.2 Recognize the basic properties of projects, including their definition.
- 1.3 Understand why effective project management is such a challenge.
- 1.4 Understand and explain the project life cycle, its stages, and the activities that typically occur at each stage in the project.
- 1.5 Understand the concept of project “success,” including various definitions of success, as well as the alternative models of success.
- 1.6 Understand the purpose of project management maturity models and the process of benchmarking in organizations.
- 1.7 Recognize how mastery of the discipline of project management enhances critical employability skills for university graduates.

#### PROJECT MANAGEMENT BODY OF KNOWLEDGE CORE CONCEPTS COVERED IN THIS CHAPTER

1. Definition of a Project (PMBok sec. 1.2)
2. Definition of Project Management (PMBok sec. 1.3)
3. Relationship to Other Management Disciplines (PMBok sec. 1.4)
4. Project Phases and the Project Life Cycle (PMBok sec. 2.1)

*The world acquires value only through its extremes and endures only through moderation; extremists make the world great, the moderates give it stability.*<sup>1</sup>

#### PROJECT PROFILE

##### Development Projects that are Transforming Africa

The African continent is on the verge of massive changes, and projects are helping to raise the standard of living for its inhabitants. The current population of 1.2 billion is expected to double by 2050, growing at some 42 million people per year. Managing the means to accommodate this expansion is the goal of a number of governmental agencies, non-governmental organizations (NGOs), and international bodies. In order to bring prosperity to a continent that has suffered through decades of misrule, colonial exploitation, and regional conflicts, dozens of important infrastructure projects are being undertaken to improve standards of living and accommodate the needs of this rapidly-increasing population. Among the major infrastructure projects that offer great promise are:

1. The North-South Corridor – In 2009, the Common Market of Eastern and Southern Africa began work on a series of road and railways designed to link seven countries and covering more than 6,000 miles. At a cost of over \$1 billion,



**FIGURE 1.1** South Africa's Jasper Solar Farm

Source: Mikeledray/Shutterstock

the North-South Corridor is expected to improve the flow of people and goods across national boundaries, generating commerce and trade.

2. **Technology Hubs** – A Chinese development firm, Zendai Property, announced in 2013 the investment of \$8 billion to build a hub for Chinese firms investing in African infrastructure. This hub, named Modderfontein New City, is being constructed outside of Johannesburg, South Africa. Kenya is getting its own technology hub, a \$14.5 billion software center named Konza Technology City, which is situated outside Nairobi, the Kenyan capital. The Kenyan government refers to Konza as the start of the “silicon savannah.”
3. **Tanzania's Bagamoyo Port** is slated to become Africa's largest port, with a capability of handling more than 20 million containers each year. The Chinese construction firm that has invested \$11 billion in the project expects to have the port completed and operational by 2045.
4. **Giant Dams** – The Grand Ethiopian Renaissance Dam (budgeted at \$4.8 billion) is intended to provide hydroelectric power to Ethiopia and several neighboring countries. Congo's Grand Inga Dam, with its expected cost of over \$100 billion, will become the largest energy-generating dam in the world and is slated for completion in 2025.
5. **South Africa's Jasper Solar Farm** – Opened in 2015, the solar farm produces enough energy to power 80,000 homes. It is the largest solar power project on the African continent.
6. **The “New Suez Canal”** – Construction started on the expansion of the existing Suez Canal in 2014, with the goal of adding a new 22-mile shipping lane. The expansion is expected to double Egypt's annual revenue from canal traffic.
7. **Expansion of Cement Production** – Dangote Cement, headquartered in Lagos, Nigeria, in 2015 signed contracts with a Chinese firm to increase its cement manufacturing capacity across 15 countries to 100 million tons by 2020. This huge increase in cement production will fuel additional infrastructure projects on the African continent for decades to come.

Raising the standard of living for an entire continent with a large expected population increase is a challenging goal. In order to accommodate the needs of these population changes, as well as improve the living standards for the entire continent, it is vital that projects be undertaken that can provide value both commercially and environmentally. Successful project management offers the means to get the best out of “good intentions” by ensuring that these and other funded projects are implemented as efficiently and effectively as possible. When development projects are viewed as the roots for future expansion, it is easy to understand their importance. Future improvements in living standards depend on the current projects being done right, as the success of these projects will spawn the need and support the willingness of firms and governments to invest in subsequent projects.<sup>2</sup>

## The Need for Projects

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**LO 1.1** Understand why project management is becoming such a powerful and popular practice in business.

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Projects are one of the principal means by which we change our world. Whether the goal is to split the atom, tunnel under the English Channel, introduce Windows 10, or plan the 2018 Winter Olympic Games in Pyeongchang, South Korea, the means through which to achieve these challenges remains the same: project management. Project management has become one of the most popular tools for organizations, both public and private, to improve internal operations, respond rapidly to external opportunities, achieve technological breakthroughs, streamline new product development, and more robustly manage the challenges arising from the business environment. Consider what Tom Peters, best-selling author and management consultant, has to say about project management and its place in business: “Projects, rather than repetitive tasks, are now the basis for most value-added in business.”<sup>3</sup> Project management has become a critical component of successful business operations in worldwide organizations.

One of the key features of modern business is the nature of the opportunities and threats posed by external events. As never before, companies face international competition and the need to rapidly pursue commercial opportunities. They must modify and introduce products constantly, respond to customers as fast as possible, and maintain competitive cost and operating levels. Does performing all these tasks seem impossible? At one time, it was. Conventional wisdom held that a company could compete using a low-cost strategy *or* as a product innovator *or* with a focus on customer service. In short, companies had to pick their competitive niches and concede others their claim to market share. In the past 20 years, however, everything turned upside down. Companies such as General Electric, Apple, Ericsson, Boeing, and Oracle became increasingly effective at realizing all of these goals rather than settling for just one. These companies seemed to be successful in every aspect of the competitive model: They were fast to market *and* efficient, cost-conscious, *and* customer-focused. How were they performing the impossible?

Obviously, there is no one answer to this complex question. There is no doubt, however, that these companies shared at least one characteristic: They had developed and committed themselves to project management as a competitive tool. Old middle managers, reported *Fortune* magazine,

are dinosaurs, [and] a new class of manager mammal is evolving to fill the niche they once ruled: project managers. Unlike his biological counterpart, the project manager is more agile and adaptable than the beast he’s displacing, more likely to live by his wits than throwing his weight around.<sup>4</sup>

Effective project managers will remain an indispensable commodity for successful organizations in the coming years. More and more companies are coming to this conclusion and adopting project management as a way of life. Indeed, companies in such diverse industries as construction, heavy manufacturing, insurance, health care, finance, public utilities, and software are becoming project savvy and expecting their employees to do the same.

## What is a Project?

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**LO 1.2** Recognize the basic properties of projects, including their definition.

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Although there are a number of general definitions of the term **project**, we must recognize at the outset that projects are distinct from other organizational processes. As a rule, a **process** refers to ongoing, day-to-day activities in which an organization engages while producing goods or services. Processes use existing systems, properties, and capabilities in a continuous, fairly repetitive manner.<sup>5</sup> Projects, on the other hand, take place outside the normal, process-oriented world of the firm. Certainly, in some organizations, such as construction, day-to-day processes center on the creation

and development of projects. Nevertheless, for the majority of organizations project management activities remain unique and separate from the manner in which more routine, process-driven work is performed. Project work is continuously evolving, establishes its own work rules, and is the antithesis of repetition in the workplace. As a result, it represents an exciting alternative to “business as usual” for many companies. The challenges are great, but so are the rewards of success.

First, we need a clear understanding of the properties that make projects and project management so unique. Consider the following definitions of projects:

A project is a unique venture with a beginning and end, conducted by people to meet established goals within parameters of cost, schedule, and quality.<sup>6</sup>

Projects [are] goal-oriented, involve the coordinated undertaking of interrelated activities, are of finite duration, and are all, to a degree, unique.<sup>7</sup>

A project can be considered to be any series of activities and tasks that:

- Have a specific objective to be completed within certain specifications
- Have defined start and end dates
- Have funding limits, if applicable
- Consume human and nonhuman resources, such as money, people, equipment
- Are multifunctional (i.e., cut across several functional lines)<sup>8</sup>

[A project is] [o]rganized work toward a predefined goal or objective that requires resources and effort, a unique (and therefore risky) venture having a budget and schedule.<sup>9</sup>

Probably the simplest definition is found in the Project Management Body of Knowledge (PMBoK) guide of the Project Management Institute (PMI). The PMI is the world’s largest professional project management association, with more than 475,000 members worldwide as of 2017. In the PMBoK guide, a project is defined as “a temporary endeavor undertaken to create a unique product, service, or result” (p. 553).<sup>10</sup>

Let us examine the various elements of projects, as identified by this set of definitions.

- **Projects are complex, one-time processes.** A project arises for a specific purpose or to meet a stated goal. It is complex because it typically requires the coordinated input of numerous members of the organization. Project members may be from different departments, other organizational units, or one functional area. For example, a project to develop a new software application for a retail company may require only the output of members of the information systems group working with the marketing staff. On the other hand, some projects, such as new product introductions, work best with representation from many functions, including marketing, engineering, production, and design. Because a project is intended to fulfill a stated goal, it is temporary. It exists only until its goal has been met, and at that point it is dissolved.
- **Projects are limited by budget, schedule, and resources.** Project work requires that members work with limited financial and human resources for a specified time period. They do not run indefinitely. Once the assignment is completed, the project team disbands. Until that point, all its activities are constrained by limitations on budget and personnel availability. Projects are “resource-constrained” activities.
- **Projects are developed to resolve a clear goal or set of goals.** There is no such thing as a project team with an ongoing, nonspecific purpose. The project’s goals, or **deliverables**, define the nature of both the project and its team. Projects are designed to yield a tangible result, either as a new product or service. Whether the goal is to build a bridge, implement a new accounts receivable system, or win a presidential election, the goal must be specific and the project organized to achieve a stated aim.
- **Projects are customer-focused.** Whether the project is responding to the needs of an internal organizational unit (e.g., accounting) or intended to exploit a market opportunity external to the organization, the underlying purpose of any project is to satisfy customer needs. In the past, this goal was sometimes overlooked. Projects were considered successful if they attained technical, budgetary, and scheduling goals. More and more, however, companies have realized that the primary goal of a project is customer satisfaction. If that goal is neglected, a firm runs the risk of “doing the wrong things well”—pursuing projects that may be done efficiently but that ignore customer needs or fail commercially.



## GENERAL PROJECT CHARACTERISTICS

Using these definitional elements, we can create a sense of the key attributes that all projects share. These characteristics are not only useful for better understanding projects, but also offer the basis for seeing how project-based work differs from other activities most organizations undertake. Projects represent a special type of undertaking by any organization. Not surprisingly, the challenges in performing them right are sometimes daunting. Nevertheless, given the manner in which business continues to evolve on a worldwide scale, becoming “project savvy” is no longer a luxury: it is rapidly becoming a necessity.

Projects are characterized by the following properties:<sup>11</sup>

1. ***Projects are ad hoc endeavors with a clear life cycle.*** Projects are nontraditional; they are activities that are initiated as needed, operate for a specified time period over a fairly well understood development cycle, and are then disbanded. They are temporary operations.
2. ***Projects are building blocks in the design and execution of organizational strategies.*** As we will see in later chapters, projects allow organizations to implement companywide strategies. They are the principal means by which companies operationalize corporate-level objectives. In effect, projects are the vehicles for realizing company goals. For example, Intel’s strategy for market penetration with ever newer, smaller, and faster computer chips is realized through its commitment to a steady stream of research and development projects that allows the company to continually explore the technological boundaries of electrical and computer engineering.
3. ***Projects are responsible for the newest and most improved products, services, and organizational processes.*** Projects are tools for innovation. Because they complement (and often transform) traditional process-oriented activities, many companies rely on projects as vehicles for going beyond conventional activities. Projects are the stepping-stones by which we move forward.
4. ***Projects provide a philosophy and strategy for the management of change.*** “Change” is an abstract concept until we establish the means by which we can make real alterations in the things we do and produce. Projects allow organizations to go beyond simple statements of intent and to achieve actual innovation. For example, whether it is Chevrolet’s Volt electric car or Samsung’s newest smartphone upgrade, successful organizations routinely ask for customers’ input and feedback to better understand their likes and dislikes. As the vehicle of change, the manner in which a company develops its projects has much to say about its ability to innovate and its commitment to change.
5. ***Project management entails crossing functional and organizational boundaries.*** Projects epitomize internal organizational collaboration by bringing together people from various functions across the company. A project aimed at new product development may require the combined work of engineering, finance, marketing, design, and so forth. Likewise, in the global business environment many companies have crossed organizational boundaries by forming long-term partnerships with other firms in order to maximize opportunities while emphasizing efficiency and keeping a lid on costs. Projects are among the most common means of promoting collaboration, both across functions and across organizations.
6. ***The traditional management functions of planning, organizing, motivation, directing, and control apply to project management.*** Project managers must be technically well versed, proficient at administrative functions, willing and able to assume leadership roles, and above all, goal-oriented: The project manager is the person most responsible for keeping track of the big picture. The nature of project management responsibilities should never be underestimated, because these responsibilities are both diverse and critical to project success.
7. ***The principal outcomes of a project are the satisfaction of customer requirements within the constraints of technical, cost, and schedule objectives.*** Projects are defined by their limitations. They have finite budgets, definite schedules, and carefully stated specifications for completion. For example, a term paper assignment in a college class might include details regarding form, length, number of primary and secondary sources to cite, and so forth. Likewise, in the Disney’s Expedition Everest case example at the end of this chapter the executive leading the change process established clear guidelines regarding performance expectations. All these constraints both limit and narrowly define the focus of the project and the options available to the project team. It is the very task of managing successful project development within such specific constraints that makes the field so challenging.



8. *Projects are terminated upon successful completion of performance objectives* or earlier in their life cycle, if results no longer promise an operational or strategic advantage. As we have seen, projects differ from conventional processes in that they are defined by limited life cycles. They are initiated, completed, and dissolved. As important alternatives to conventional organizational activities, they are sometimes called “temporary organizations.”<sup>12</sup>

Projects, then, differ from better-known organizational activities, which often involve repetitive processes. The traditional model of most firms views organizational activities as consistently performing a discrete set of activities. For example, a retail-clothing establishment buys, stocks, and sells clothes in a continuous cycle. A steel plant orders raw materials, makes steel, and ships finished products, again in a recurring cycle. The nature of these operations focuses our attention on a process orientation; that is, the need to perform work as efficiently as possible in an ongoing manner. When its processes are well understood, the organization always seeks better, more efficient ways of doing the same essential tasks. Projects, because they are discrete activities, violate the idea of repetition. They are temporary activities that operate outside formal channels. They may bring together a disparate collection of team members with different kinds of functional expertise. Projects function under conditions of uncertainty, and usually have the effect of shaking up normal corporate activities. Because of their unique characteristics, they do not conform to common standards of operations; they do things differently and often reveal new and better ways of doing things. Table 1.1 offers some other distinctions between project-based work and the more traditional, process-based activities. Note a recurring theme: projects operate in radical ways that consistently violate the standard, process-based view of organizations.

Consider Apple’s use of projects to push the development of a constantly-changing range of product and service offerings. When it was first introduced in 2003, the iPod was Apple’s portable MP3 player that could be integrated with Apple’s popular iTunes site to record and play music downloads. From its introduction in 2003 to 2015, when Apple stopped reporting sales of the product, consumers had bought more than 400 million iPods, generating \$65 billion in revenue for the firm. Customers have also purchased more than 45 billion songs through Apple’s iTunes online store. In fact, Apple’s iTunes division became the largest U.S. market for music sales; by 2015 it was accounting for 29% of all music sold in the United States and 64% of the digital music market. More recently, as steadily declining sales raised concern that the music downloads market has become saturated and less profitable, Apple introduced its Apple Music site to attract fans of music streaming, competing directly with Spotify and Pandora, among other music streaming services. By 2017 Apple Music had enrolled over 20 million subscribers, making it the second-largest streaming service in the world. Each of these steps demonstrates Apple’s commitment to using new project ventures as a means of avoiding a business as usual mentality, as it seeks to remain on the leading edge of the industry.<sup>13</sup>

**TABLE 1.1** Differences Between Process and Project Management<sup>14</sup>

Process	Project
Repeat process or product	New process or product
Several objectives	One objective
Ongoing	One shot—limited life
People are homogenous	More heterogeneous
Well-established systems in place to integrate efforts	Systems must be created to integrate efforts
Greater certainty of performance, cost, schedule	Greater uncertainty of performance, cost, schedule
Part of line organization	Outside of line organization
Bastions of established practice	Violates established practice
Supports status quo	Upsets status quo

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A similar set of events is currently unfolding, centered on Apple's successive upgrades of its iPad tablet. Among the numerous features offered by the iPad is the ability to download books, including college textbooks, directly from publishers, effectively eliminating the traditional middlemen—bookstores—from the process. So radical are the implications of the iPad and competing tablets like Microsoft's Surface Pro and Samsung's Galaxy to capture a share of this market that large bookstores have been forced to adapt their business models to the new electronic reality of book purchases by offering their own readers; for example, Kindle for Amazon. Some experts are suggesting that within a decade tablets and other electronic readers will make traditional books obsolete, capturing the majority of the publishing market. These are just some examples of the way that project-driven technological change, such as that at Apple, is reshaping the competitive landscape.

Given the enthusiasm with which **project management** is being embraced by so many organizations, we should note that the same factors that make project management a unique undertaking are also among the main reasons why successful project management is so difficult. The track record of project management is by no means one of uninterrupted success, in part because many companies encounter deep-rooted resistance to the kinds of changes needed to accommodate a project philosophy. Indeed, recent research into the success rates for projects offers some grim conclusions:

- A study of more than 300 large companies conducted by the consulting firm KPMG found that software and/or hardware development projects fail at the rate of 65%. Of companies studied, 65% reported projects that went grossly over budget, fell behind schedule, did not perform as expected, or all of the above. Half of the managers responding indicated that these findings were considered "normal."<sup>15</sup>
- A study by the META Group found that "more than half of all (information technology) IT projects become runaways—overshooting their budgets and timetables while failing to deliver fully on their goals." According to the Gallup Business Review, the U.S. economy loses somewhere between \$50 and \$150 billion every year because of failed IT projects.<sup>16</sup>
- Joe Harley, the Chief Information Officer at the Department for Work and Pensions for the UK government, stated that "only 30%" of technology-based projects and programs are a success—at a time when taxes are funding an annual budget of £14 billion (over \$22 billion) on public sector IT, equivalent to building 7,000 new primary schools or 75 hospitals a year.<sup>17</sup>
- The United States National Nuclear Security Administration has racked up \$16 billion in cost overruns on 10 major projects that are a combined 38 years behind schedule, the Government Accountability Office reports. For example, at Los Alamos National Laboratory a seven-year, \$213 million upgrade to the security system that protects the lab's most sensitive nuclear bomb-making facilities did not work. A party familiar with the organization cites a "pervasive culture of tolerating the intolerable and accepting the unacceptable."<sup>18</sup>
- One out of six IT projects has an average cost overrun of 200% and a schedule overrun of 70%. Around 45% of companies admit that they are unclear about the business objectives of their IT projects. The Chaos Summary 2015 survey of 50,000 projects worldwide by The Standish Group reported similar findings: The majority of all projects were rated either as "challenged" due to late delivery, being over budget, or delivering less than required features, or "failed" when they were canceled prior to completion or the product developed was never used. Researchers have concluded that the average success rate of business-critical application development projects is 29%. Their statistics have remained remarkably steady since 1994.<sup>19</sup>
- The Special Inspector General for Afghanistan Reconstruction (SIGAR) reported that the U.S. spent more than \$110 billion on postwar reconstruction projects, with some estimates suggesting that over one-third of the costs of these projects was lost due to waste, fraud, and poor planning or project execution. In a recent interview, John Sopko, the Special Investigator General, noted that because of project waste along with contracting and performance errors, "We've built an Afghanistan they can't afford." As one example, he cites the \$400 million purchase of aircraft for an Afghanistan Air Force; aircraft the government couldn't use that were ultimately scrapped for a near total loss.<sup>20</sup>

These findings underscore an important point: although project management is becoming popular, it is not easy to assimilate into the conventional processes of most firms. For every firm discovering the benefits of projects, many more underestimate the problems involved in becoming project savvy.

These studies also point to a core truth about project management: we should not overestimate the benefits to be gained from project management while underestimating the commitment required to make a project work. There are no magic bullets or quick fixes in the discipline. Like any other valuable activity, project management requires preparation, knowledge, training, and commitment to basic principles. Organizations wanting to make use of project-based work must recognize, as Table 1.1 demonstrates, that its very strength often causes it to operate in direct contradiction to standard, process-oriented business practices.

## PROJECT PROFILE

### President Obama Signs the Program Management Improvement and Accountability Act

For those who ever wondered just how seriously the U.S. federal government takes project management, it is interesting to discover that they are making a law to regulate it. In one of the final acts of President Obama's administration, he signed into law the Program Management Improvement and Accountability Act (PMIAA) in December, 2016. This act of Congress is intended to enhance both accountability and best practices in project and program management throughout the federal government. The legislation, strongly endorsed by the Project Management Institute (PMI), was approved by both chambers of Congress with overwhelming bi-partisan support.

The PMIAA reforms federal program management policy in four important ways:

1. Creating a formal job series and career path for program managers in the federal government.
2. Developing a standards-based program management policy across the federal government.
3. Recognizing the essential role of executive sponsorship and engagement by designating a senior executive in federal agencies to be responsible for program management policy and strategy.
4. Sharing knowledge of successful approaches to program management through an interagency council on program management.

Among the reasons cited for formalizing the importance of project/program management is that only 64 percent of government strategic initiatives ever meet their goals and business intent, while government entities waste \$101 million for every \$1 billion spent on project and programs. Research also shows that developing best practices can result in improved efficiency and less money being wasted. Most importantly, organizations see more projects delivering expected value to stakeholders on time and within budget.<sup>21</sup>



**FIGURE 1.2** President Obama signing the PMIAA into Law

Source: REX/Shutterstock

## Why are Projects Important?

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**LO 1.3** Understand why effective project management is such a challenge.

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There are a number of reasons why projects and project management can be crucial in helping an organization achieve its strategic goals. David Cleland, a noted project management researcher, suggests that many of these reasons arise from the very pressures that organizations find themselves facing.<sup>22</sup>

1. **Shortened product life cycles.** The days when a company could offer a new product and depend on having years of competitive domination are gone. Increasingly, the life cycle of new products is measured in terms of months or even weeks, rather than years. One has only to look at new products in electronics or computer hardware and software to observe this trend. Interestingly, we are seeing similar signs in traditional service-sector firms, which also have recognized the need for agility in offering and upgrading new services at an increasingly rapid pace.
2. **Narrow product launch windows.** Another time-related issue concerns the nature of opportunity. Organizations are aware of the dangers of missing the optimum point at which to launch a new product and must take a proactive view toward the timing of product introductions. For example, while reaping the profits from the successful sale of Product A, smart firms are already plotting the best point at which to launch Product B, either as a product upgrade or a new offering. Because of fierce competition, these optimal launch opportunities are measured in terms of months. Miss your launch window, even by a matter of weeks, and you run the risk of rolling out an also-ran.
3. **Increasingly complex and technical products.** It has been well-documented that the average automobile today has more computing power than the Apollo 11 space capsule that allowed astronauts to walk on the moon. This illustrates a clear point: the world today is complex. Products are complicated, technically sophisticated, and difficult to produce efficiently. The public's appetite for the next big thing continues unabated and substantially unsatisfied. We want the new models of our consumer goods to be better, bigger (or smaller), faster, and more complex than the old ones. Firms constantly upgrade product and service lines to feed this demand. This causes multiple problems in design and production as we continually seek to push the technical limits. Furthermore, in anticipating future demand many firms embark on expensive programs of research and development while attempting to discern consumer tastes. The effect can be to erroneously create expensive and technically sophisticated projects that we assume the customer will want. For example, Rauma Corporation of Finland developed a state-of-the-art loader for the logging industry. Rauma's engineers loaded the product with the latest computerized gadgetry and technologies that gave the machine a space-age feel. Unfortunately, the chief customer for the product worked in remote regions of Indonesia, with logistics problems that made servicing and repairing the loaders impractical. Machines that broke down had to be airlifted more than 1,000 miles to service centers. Since the inception of this project, sales of the logging machinery have been disappointing. The project was an expensive failure for Rauma and serves to illustrate an important point: unless companies find a way to maintain control of the process, an engineering for engineering's sake mentality can quickly run out of control.<sup>23</sup>
4. **Global markets.** The early twenty-first century has seen the emergence of enormous new markets for almost every type of product and service. Former closed or socialist societies, as well as rapidly developing economies such as Brazil, China, Vietnam, and India, have added huge numbers of consumers and competitors to the global business arena. The increased globalization of the economy, coupled with enhanced methods for quickly interacting with customers and suppliers, has created a new set of challenges for business. These challenges also encompass unique opportunities for those firms that can quickly adjust to this new reality. In the global setting, project management techniques provide companies with the ability to link multiple business partners and respond quickly to market demand and supplier needs, while remaining agile enough to anticipate and respond to rapid shifts in consumer tastes. Using project management, successful organizations of the future will recognize and learn to rapidly exploit the prospects offered by a global business environment.