

清华管理学系列英文版教材

# Project Management for Business and Technology

Principles and Practice

Second Edition

# 面向商务和技术 的项目管理

(第2版)

原理与实践

John M. Nicholas

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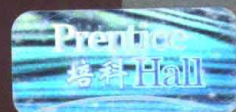
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**Project Management for Business and Technology**  
**Principles and Practice**

**【Second Edition】**

John M. Nicholas

*Loyola University Chicago*

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# 出版说明

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为了适应经济全球化的发展趋势,满足国内广大读者了解、学习和借鉴国外先进的管理经验和掌握经济理论的前沿动态,清华大学出版社与国外著名出版公司合作影印出版一系列英文版经济管理方面的图书。我们所选择的图书,基本上是已再版多次、在国外深受欢迎、并被广泛采用的优秀教材,绝大部分是该领域中较具权威性的经典之作。在选书的过程中,我们得到了很多专家、学者的支持、帮助和鼓励,在此表示谢意!清华管理学系列英文版教材由清华大学经济管理学院马力、毛波、王雪莉、刘丽文、朗立君、钱小军、姜彦福、蔚林巍等老师审阅,在此一并致谢!

由于原作者所处国家的政治、经济和文化背景等与我国不同,对书中所持观点,敬请广大读者在阅读过程中注意加以分析和鉴别。

我们期望这套影印书的出版对我国经济科学的发展能有所帮助,对我国经济管理专业的教学能有所促进。

欢迎广大读者给我们提出宝贵的意见和建议;同时也欢迎有关的专业人士向我们推荐您所接触到的国外优秀图书。

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世纪之交,中国与世界的发展呈现最显著的两大趋势——以网络为代表的信息技术的突飞猛进,以及经济全球化的激烈挑战。无论是无远弗界的因特网,还是日益密切的政治、经济、文化等方面的国际合作,都标示着21世纪的中国是一个更加开放的中国,也面临着一个更加开放的世界。

教育,特别是管理教育总是扮演着学习与合作的先行者的角色。改革开放以来,尤其是20世纪90年代之后,为了探寻中国国情与国际上一切优秀的管理教育思想、方法和手段的完美结合,为了更好地培养高层次的“面向国际市场竞争、具备国际经营头脑”的管理者,我国的教育机构与美国、欧洲、澳洲以及亚洲一些国家和地区的大量的著名管理学院和顶尖跨国企业建立了长期密切的合作关系。以清华大学经济管理学院为例,2000年,学院顾问委员会成立,并于10月举行了第一次会议,2001年4月又举行了第二次会议。这个顾问委员会包括了世界上最大的一些跨国公司和中国几家顶尖企业的最高领导人,其阵容之大、层次之高,超过了世界上任何一所商学院。在这样高层次、多样化、重实效的管理教育国际合作中,教师和学生与国外的交流机会大幅度增加,越来越深刻地融入到全球性的教育、文化和思想观念的时代变革中,我们的管理教育工作者和经济管理学习者,更加真切地体验到这个世界正发生着深刻的变化,也更主动地探寻和把握着世界经济发展和跨国企业运作的脉搏。

我国管理教育的发展,闭关锁国、闭门造车是绝对不行的,必须同国际接轨,按照国际一流的水准来要求自己。正如朱镕基总理在清华大学经济管理学院成立十周年时所发的贺信中指出的那样:“建设有中国特色的社会主义,需要一大批掌握市场经济的一般规律,熟悉其运行规则,而又了解中国企业实情的经济管理人才。清华大学经济管理学院就要敢于借鉴、引进世界上一切优秀的经济管理学院的教学内容、方法和手段,结合中国的国情,办成世界第一流的经管学院。”作为达到世界一流的一个重要基础,朱镕基总理多次建议清华的MBA教育要加强英语教学。我体会,这不仅因为英语是当今世界交往中重要的语言工具,是连接中国与世界的重要桥梁和媒介,而且更是中国经济管理人才参与国际竞争,加强国际合作,实现中国企业的国际战略的基石。推动和实行英文教学并不是目的,真正的目的在于培养学生——这些未来的企业家——能够具备同国际竞争对手、合作伙伴沟通 and 对抗的能力。按照这一要求,清华大学经济管理学院正在不断推动英语教学的步伐,使得英语不仅是一门需要学习

的核心课程,而且渗透到各门专业课程的学习当中。

课堂讲授之外,课前课后的大量英文原版著作、案例的阅读对于提高学生的英文水平也是非常关键的。这不仅是积累相当的专业词汇的重要手段,而且是对学习者思维方式的有效训练。

我们知道,就阅读而言,学习和借鉴国外先进的管理经验和掌握经济理论动态,或是阅读翻译作品,或是阅读原著。前者属于间接阅读,后者属于直接阅读。直接阅读取决于读者的外文阅读能力,有较高外语水平的读者当然喜欢直接阅读原著,这样不仅可以避免因译者的疏忽或水平所限而造成的纰漏,同时也可以尽享原作者思想的真实表达。而对于那些有一定外语基础,但又不能完全独立阅读国外原著的读者来说,外文的阅读能力是需要加强培养和训练的,尤其是专业外语的阅读能力更是如此。如果一个人永远不接触专业外版图书,他在获得国外学术信息方面就永远会比别人差半年甚至一年的时间,他就会在无形中减弱自己的竞争能力。因此,我们认为,有一定外语基础的读者,都应该尝试一下阅读外文原版,只要努力并坚持,就一定能过了这道关,到那时就能体验到直接阅读的妙处了。

在掌握大量术语的同时,我们更看重读者在阅读英文原版著作时对于西方管理者或研究者的思维方式的学习和体会。我认为,原汁原味的世界级大师富有特色的表达方式背后,反映了思维习惯,反映了思想精髓,反映了文化特征,也反映了战略偏好。知己知彼,对于跨文化的管理思想、方法的学习,一定要熟悉这些思想、方法所孕育、成长的文化土壤,这样,有朝一日才能真正“具备国际战略头脑”。

以往,普通读者购买和阅读英文原版还有一个书价的障碍。一本外版书少则几十美元,多则上百美元,一般读者只能望书兴叹。随着全球经济合作步伐的加快,目前在出版行业有了一种新的合作出版的方式,即外文影印版,其价格几乎与国内同类图书持平。这样一来,读者可以不必再为书价发愁。清华大学出版社这些年在这方面一直以独特的优势领先于同行。早在1997年,清华大学出版社敢为人先,在国内最早推出一批优秀商学英文版教材,规模宏大,在企业界和管理教育界引起不小的轰动,更使国内莘莘学子受益良多。

为了配合清华大学经济管理学院推动英文授课的急需,也为了向全国更多的MBA试点院校和更多的经济管理学院的教师和学生提供学习上的支持,清华大学出版社再次隆重推出与世界著名出版集团合作的英文原版影印商学教科书,也使广大工商界人士、经济管理类学生享用到最新最好质优价廉的国际教材。

祝愿我国的管理教育事业在社会各界的大力支持和关心下不断发展、日进日新;祝愿我国的经济建设在不断涌现的大批高层次的面向国际市场竞争、具备国际经营头脑的管理者的勉力经营下早日中兴。

赵纯钧 教授

清华大学经济管理学院院长  
全国工商管理硕士教育指导委员会副主任

To Sharry, Julia, Joshua, and Abigail

# PREFACE

---

When people see something impressive—a bridge arching high over a canyon, a space probe touching down on a distant planet, a graceful curlicue ramp on a freeway, a motion picture such as *Titanic* (so real you think you're there!), or a nifty computer the size of your hand—they wonder, "how did they do that?" By *they*, of course, they are referring to the creators, designers, and builders, the people who thought up and actually made those things. Rarely do they mean the *managers*, the people who organized and lead the effort that brought those wondrous things from a concept or idea into reality.

This book is about the managers—project managers—and what they do and how they do it. Project managers are the mostly unsung heroes of business and technology, people who, in most cases, stand outside the public eye but without whose talent, skills, and hard work most neat ideas would never amount to anything. Certainly the project manager is but one of the many people who help shape the products, systems, and artifacts of modern life, those things we take for granted as well as those we marvel at. Nonetheless, the project manager is the one who gets all of the others involved, and then organizes and directs them so their combined efforts will come out right. (Sometimes, though rarely, the manager and the creator happen to be the same. Woody Allen, Kelly Johnson, and Gutzon Borglum are examples. Their life work—in motion pictures, supersonic airplanes, and Mount Rushmore, respectively—represent not only creative or technological genius, but leadership and managerial talent as well.)

The pace of change in business and technology is accelerating. The last few decades have seen business be transformed from domestic, nationalistic enterprises and markets into multinational enterprises and a single global market. As a result, no matter what your perspective there is more of everything to contend with—more ideas, competitors, resources, constraints, and, certainly, more people doing and wanting things. The accelerated rate of change in technology means that products or processes are evolving at a more rapid pace, and as a result the life cycles of the things we use and rely on are getting shorter. This accelerated rate of change has a direct impact on the frequency and conduct of projects—whether projects to develop products, systems, or processes that compete in local, domestic, and international markets; projects to create and implement new ways of meeting demand for energy, recreation, housing, communication, transportation, and food; or projects to answer basic questions in science or to resolve problems such as hunger, disease, and pollution. All of this project activity has spurred a growing interest in ways to plan and control projects, and to organize and lead people and groups to meet the needs of customers, markets, and society within the bounds of limited time and resources.

Associated with the growing interest in project management is the growing need to *train* project managers. In the past and still today, project managers were largely



persons who had demonstrated some exceptional capability, though not necessarily as a manager. If you were a good engineer, programmer, systems analyst, architect, or accountant, eventually you would become a project manager. Then, presumably, you would pick up the necessary management skills somewhere along the way. The flaw in this approach is that project management encompasses a broad range of skills—managerial, leadership, interpersonal—that are much different than the skills associated with the technology of the particular project. There is no compelling reason to presume that the project environment alone will provide the opportunity for someone to “pick up” the skills necessary for project management.

As a text and handbook, this book is about the “right” way to manage projects. It is intended for advanced undergraduate and graduate university students, and for practicing managers in business and technology. As the title says, it is a book about principles *and* practice, meaning that the topics in it are meant to be applied. It covers the big picture of project management—origins, applications, and philosophy, as well as the nitty-gritty, how-to steps. It describes the usual project management topics of networks, schedules, budgets, and controls as well as the human side of project management.

Why a book on business *and* technology? In my experience, technical specialists such as engineers, programmers, architects, chemists, and so on, often have little or no management training. This book, which includes many technology project examples, provides somewhat broad exposure to relevant business concepts and management specifics to help them get started as project managers.

What about those people involved in product-development, marketing, process-improvement, and related projects commonly thought of as “business projects”? Just as students of technology seldom get management training as part of their formal education, students of business seldom get training about the conduct of projects in technology. For students of business this book reveals not only how “business” projects are conducted, but what happens in a wide variety of engineering, construction, and other kinds of “technical” projects.

Of course, technical projects are *also* business projects because they involve business issues such as customer satisfaction, resource utilization, cost, profits, and so on. Although engineering and development projects may appear different from nonengineering projects, both types are similar in the way they are managed. This book conceptualizes all projects using a single framework called the Systems Development Cycle. This framework serves as a general scheme for illustrating commonalities and differences among projects.

This book is an outgrowth of more than a decade of teaching project management at Loyola University Chicago, preceded by several years of practical experience in business and technology projects, including design and flight test work in the aircraft industry, and software applications development and process improvement projects in banking. From this practical experience I developed an appreciation not only for the business-management side of project management—systems and procedures for planning, scheduling, budgeting, and control—but for the human and organizational side as well. I saw the benefits of good communication, trust, and teamwork on project outcomes, as well as the costs of emotional stress and group conflict. I observed that the most successful projects usually were those where trust, good communications, and teamwork flourished, regardless of the formal planning and control systems in place. This book largely reflects these personal experiences and learnings. Of course, the book reflects much more than my own personal experience. To cover project management in a more general, comprehensive sense, I had to rely on the published works of many other authors, and on the suggestions of colleagues and reviewers.

In this second edition I have revised and added substantial new material to incorporate current examples and reviewers' suggestions, and to take advantage of the growing body of literature in project management. Every chapter has been revised and updated. The most significant changes are as follows: Chapters 1 and 2 have many new examples and case studies of projects and project managers. Chapters 4 and 5 have increased coverage of important front-end topics such as preparation of RFPs and proposals, and definition of user needs, project objectives, requirements, and specifications. Chapter 7 has been revised to cover activity-oriented (rather than event-oriented) scheduling. Chapter 8 has expanded coverage of constrained-resource scheduling and multiple-project scheduling. Chapter 9 includes a new section on the various methods of cost estimating. Chapter 10 is a new chapter that addresses models and practices for assessing and managing project risk. Chapter 11 is expanded to address multiple aspects of project control: scope, quality, schedule, performance, and change control. Chapter 12 is completely revised and covers current software applications and Web-based project management. Chapter 14 is expanded and discusses not only project organization, but mechanisms for project integration including integrated product development teams, concurrent engineering, and quality function deployment. To every chapter I have added new examples and end-of-chapter case studies.

My goal in writing this book has been to provide students and practicing managers of projects the most practical, current, and interesting text possible. I appreciate hearing your comments and suggestions. Please send them to [jnichol@luc.edu](mailto:jnichol@luc.edu).

## Acknowledgments

Writing a book is a project and, like most projects, reflects the contributions of many people. Here I want to acknowledge and give special thanks to those who contributed the most. First, thanks to my research assistants. In general, research assistants do a lot of work—academic research as well as gofer work, and without their toiling efforts most professors would accomplish far less. I have been fortunate to have had the assistance of two such bright and capable people, Elisa Denney, who reviewed much of the book, helped draft most of Chapter 12, and served as a constant source of energy; and Hollyce James, who helped with revisions and provided editorial competency. Also thanks to Cary Morgan and Louis Schwartzman, my research assistants for the first edition.

I want to express appreciation to Dr. Enrique Venta for reviews and assistance in portions of this and the first edition. Others who deserve special mention and thanks are Dr. Harold Dyck, Dr. Samuel Ramenofsky, Dr. Donald Meyer, Elaine Strnad, Paul Flugel, John Edison, Sharon Tylus, and Debbie Gillespie. I also want to acknowledge the influence of three of my professors, Charles Thompson and Gustave Rath at Northwestern University, and Dick Evans at the University of Illinois, whose philosophy and teachings helped shaped this book.

My appreciation to the following who served as reviewers and provided dozens of helpful suggestions: Thomas B. Clark of Georgia State University; Frank Deromedi of Golden Gate University; Bruce Hartman of the University of Arizona; Joseph L. Orsini of California State University, Sacramento; Peter Papantos of DeVry Institute; and Thomas Tice of California State Polytechnic University, Pomona.

My wife Sharry also gets special thanks. She read the draft for the first edition, provided numerous suggestions, and helped reduce the amount of "techno-jargon" in the book. She also managed the home front, allowed me the time to pursue and complete this project, and was a steadfast source of support.

Thanks also to the folks at Prentice Hall and BookMasters, especially to Tom Tucker for his encouragement and support for this second edition.

There are other colleagues, students, and friends, some mentioned in endnotes elsewhere throughout the book, who provided support, encouragement, and reference materials; to them I say thank you. Despite the assistance of so many people and my own best efforts, there are still likely to be omissions or errors. I had final say, and I accept responsibility for them.

John M. Nicholas

## ABOUT THE AUTHOR

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JOHN NICHOLAS is professor of information systems and operations management, and associate dean of the Graduate School of Business, Loyola University Chicago. He is an active teacher, writer, and researcher in project management and manufacturing management, and has written extensively about performance issues of teams working in confined, hazardous, stressful environments. He conducts executive seminars and has been a consultant on project management and process improvement.

John is the author of numerous academic and technical publications, including two textbooks, *Managing Business and Engineering Projects* (1990) and *Competitive Manufacturing Management* (1998). He has held the positions of engineer and team leader on aircraft development projects at Lockheed-Martin Corporation, business systems analyst on bank operations at BankAmerica, and research associate on energy-environmental research projects at Argonne National Laboratory. He has a B.S. in aeronautical and astronautical engineering and an M.B.A. in operations research from the University of Illinois, Urbana-Champaign, and a Ph.D. in industrial engineering and applied behavioral science from Northwestern University.

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