营销工程

第 2 版

（美） Gary L. Lilien
Arvind Rangaswamy 著

PEARSON
Prentice Hall

Marketing Engineering

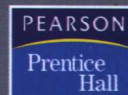Computer-Assisted Marketing Analysis and Planning

Second Edition

清华大学出版社

营销工程

第 2 版

（美） Gary L. Lilien
Arvind Rangaswamy
著

Marketing Engineering

Computer-Assisted Marketing Analysis and Planning

Second Edition

出 版 说 明

　　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！清华营销学系列英文版教材由清华大学经济管理学院、北京大学经济学院和中国人民大学商学院李欲晓、刘群艺、赵平、段志蓉、谢赞、成栋等老师审阅，在此一并致谢！

　　由于原作者所处国家的政治、经济和文化背影等与我国不同，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。

清华大学出版社·闻洁编辑室

2003年11月

总 序

　　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、合作伙伴沟通和对抗的能力。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

V

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。

赵纯均 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

Preface

Several forces are transforming the structure and content of the marketing manager's job. As a profession, marketing is evolving. It is no longer based primarily on conceptual content. Marketing resembles design engineering—it consists of putting together data, models, analyses, and computer simulations to learn about the marketplace and to design effective marketing plans. While many view traditional marketing as art and some view it as science, the new marketing increasingly looks like engineering (that is, combining art and science to solve specific problems). Our purpose in writing this book is to help educate and train a new generation of marketing managers.

Several key forces are changing the marketer's job:

Pervasive high-powered personal computers on networks: During the 1980s marketing managers used personal computers mainly for such tasks as composing letters and presentations and doing simple spreadsheet analyses. Today many marketing managers have the equivalent of an early supercomputer on their desks. And that computer is networked to other PCs and to the company's mainframe on a local area network (LAN), and to external computers and databases all over the world through the Internet. This means that a marketing manager can access current data, reports, and expert opinions, and he or she can also combine and process that information in new ways to enhance decision making. Today basing decisions on such information is a minimum requirement to be a player in many industries.

Exploding volumes of data: A brand manager in the packaged goods industry now sees perhaps a thousand times the volume of data (more frequently collected in finer detail) he or she saw five years ago. The growth of e-commerce, database marketing and direct marketing parallels data explosions in other industries as well. The human brain, however, has not become comparably more powerful in the same period. More data cannot lead to better decision making unless managers learn how to use that data in meaningful ways. If data are a burden, then insights provide relief.

Reengineering marketing activities: All over the world organizations face increasingly well-informed customers who seek value. As a result they are carefully scrutinizing the productivity of all management processes. To reduce their costs and to improve productivity, they are reengineering many marketing functions, processes, and activities. They are reengineering such activities as segmentation and targeting, new product development, market measurement and analysis, and customer satisfaction management for the information age.

Flatter, right-sized organizations: Organizations could respond effectively to the afore-mentioned trends using traditional organizational mechanisms if they trained an army of specialists to harness computer hardware, software, networks, and data. They do not have that luxury. Global competition is driving organizations everywhere to do more with fewer employees. Managers are finding themselves empowered (i.e., without support staff): they have the hardware, software, and data at their desks and are expected to use them, operating independently.

Marketing managers must learn to function in the rapidly changing environment and to exploit evolving trends. Firms and business schools can help marketing managers to cope in two ways. They can offer traditional, concept-based education and training, with the hope that good people will figure out on their own how to cope with the changing environment. The education-as-usual approach will always have some success—well-motivated and intelligent marketers will figure out how to get reasonable value from the new resources. This approach is analogous to lecturing golf novices on the rules and giving them golf clubs and self-training books. Through study, networking, and observing successful golfers, some novices will become pretty good golfers. Others will become duffers. Still others will quit the game because it seems too hard. The lack of formal training limits development.

Those who want to excel need lessons, especially early on. Hence another way to help marketing managers respond to the changes is to provide information-age-specific education and training. There will always be an important role for marketing concepts, and using the powerful information tools now available requires sound conceptual grounding. But marketers need much more than concepts to fully exploit the resources available to them. They need to move from conceptual marketing to marketing engineering: *using computer decision models in making marketing decisions.* In this book we integrate concepts, analytic marketing techniques, and operational software to train the new generation of marketers, helping them to become marketing engineers.

OBJECTIVES FOR THE STUDENT

We designed this book for you, the business school student or marketing manager, who seeks the education you need to perform effectively in information-technology-intensive environments. Most traditional books focus on marketing from conceptual, empirical, or qualitative perspectives. With this book we aim to train marketing engineers to translate concepts into context-specific operational decisions and actions using analytical, quantitative, and computer modeling techniques. We link theory to practice and practice to theory.

Our specific objectives for the book are

- To help you gain an understanding of the role of analytical techniques and computer models for enhancing marketing decision making in modern enterprises
- To improve your skills in viewing marketing processes and relationships systematically and analytically
- To expose you to a number of examples demonstrating the value of marketing engineering in real managerial contexts
- To provide you with a software toolkit, a companion product of this book, that will enable you to apply marketing engineering to real marketing decision problems

Our pedagogical philosophy embraces two main principles: *learning by doing* and *end-user modeling.* Most of the concepts we describe have software implementation and at least one problem or case you can resolve by using the software. You may make errors and

struggle at times, attempting to apply the tools. That is part of the learning-by-doing process; you will learn what the tools and software can do as well as what they cannot do. Traditional methods of teaching in business schools (i.e., lectures and case analyses) do not go far enough in helping students to make decisions, assess risks, and solve problems. The learning-by-doing approach extends traditional marketing education. With model-based tools for decision making, you can learn to anticipate and deal with the potential consequences of your decisions—this will help you improve your strategic thinking, sensitize you to customer needs, force you to anticipate competitive moves, and develop implementation plans. In short, you should not only learn to improve how you make marketing decisions, but also how to derive the maximum benefits from your decisions.

Decision models range from large-scale, enterprise-wide applications to those that can be quickly put together by an individual with an understanding of basic marketing and marketing engineering. We emphasize end-user modeling here. End-user modeling has the characteristics of good engineering: do as good a job as you can with the time and resources you have available.

Good end-user modeling provides direct benefits, permits rapid prototyping for more elaborate approaches, and makes the user a better customer (and critic) of larger, enterprise-wide applications. We are not trying to train you to be a technical specialist. Rather we hope to prepare you to put together technically simple but operationally useful decision models and to become astute users of those models and of the results of models that others have developed.

NEW FOR THE SECOND EDITION

The first edition of Marketing Engineering, published four years ago, had as its objective to provide the background and tools needed to train information-age marketers. Our aim was to help marketing students move from conceptual marketing to marketing engineering—to access and use computer decision models when making marketing decisions. As such, that edition combined 26 different software tools with a two-volume book and tutorial package that implemented our pedagogical philosophy: learning by doing and end-user modeling.

The positive (and negative feedback) associated with the first edition has lead to this second edition. Reviews of the concepts and the tools that we included were very positive. Hence, while we have updated the material and the references, we have changed very little of the core of the book, either in terms of the basic textual material or in terms of specific implementations of our software.

Criticisms of the book were mainly associated with

- Its high price, necessitated by the breadth of the ME package—two volumes, CD-ROM, 26 software packages, instructor's manual, videotapes, and web site;
- The difficulty and complexity of getting the latest software distributed and working on different systems; and
- The limited set of data sets/cases for classroom use.

This second edition addresses these concerns by a redesign of the ME package to be accessible through the Internet. While a single softcover textbook remains, there is no longer a CD-ROM or a tutorial volume included with the text. Cases and exercises have been integrated into the single volume; tutorials (and other electronic components of the text) are now available on the Internet at *www.mktgeng.com*.

Adopters have three options for accessing the software:

1. The latest version of the software will be available to book adopters for free for a year on the Internet (but will require the current versions of Windows and Excel to run).
2. Academic adopters can have a version installed and made available on a local area network to speed up response time.
3. For most rapid response, individuals can purchase, download and run the software locally, without the need for an Internet connection. (This version will support versions of Excel 7 and later under Windows 95 and later.)

Thus, in this second edition, we have:

■ Revised the text, with corrections, and enhancements and combined the text with the cases into a single volume.
■ Made the software available separately from the book with access options as noted above.
■ Made enhancements to several of the most frequently used software modules.

ORGANIZATION

The text for the second edition is organized as follows:

In Part 1 (Chapters 1 and 2) we introduce and define marketing engineering and develop key marketing engineering building blocks—market response models.

In Part 2 (Chapters 3 through 6) we focus on strategic marketing issues such as segmentation, targeting, positioning, market selection, portfolio analysis, market measurement, and strategic planning.

In Part 3 (Chapters 7 through 10) we address tactical marketing issues such as product design, advertising and communications, salesforce deployment, outlet location, and price and promotion decisions.

In Part 4 (Chapter 11) we conclude, summarizing some key points and highlighting new developments that are driving the future of marketing engineering.

Each chapter also contains cases and problem sets that are keyed to the major concepts. We have also created a Web site, *www.mktgeng.com*, to provide the software for running the models described in the book. The Web site contains tutorials, help files, tips and other resources for using our software and for deriving the maximum benefits from marketing engineering. We update this site frequently to ensure that you will always have access to the latest software and accompanying resources.

In addition, instructors who adopt the book receive videotapes that highlight award-winning marketing engineering applications and the impact that those applications have had at the following firms:

■ ABB Electric (the profitable use of choice-based segmentation)
■ Marriott Hotels (the use of conjoint analysis to design the Courtyard by Marriott hotel)
■ ASSESSOR (the use of the ASSESSOR pretest market model and procedure at hundreds of firms)

- AT&T (the use of systematic copy testing to develop AT&T's cost-of-visit advertising campaign)
- Syntex Labs (the use of judgmental response functions to size and allocate a salesforce)
- American Airlines (the use of a yield management system to increase profits)

USES OF THE BOOK FOR INSTRUCTORS

We designed this book primarily as a text for a one-semester, capstone MBA course. Students need not have strong backgrounds in quantitative methods; however, it will be helpful if they have some quantitative and marketing background and some facility with microcomputers and related (Windows-based) software. We have used the material successfully in executive programs and in undergraduate classes as well.

As there are 26 software modules (each with a different focus), the book includes twice as much material as can be covered in a normal one-semester course. The software and related problems should be viewed as a menu; students need not use all the software to gain benefits from the material. Indeed we find that students can readily absorb only 6 to 10 modules in a semester. For shorter courses and executive programs, you should make a much more limited selection.

Many of the software modules are intended for general use (i.e., not just for the problem set provided); they can be used for term projects that can provide a very valuable learning experience.

Many of us recognize that reading textbooks or listening to lectures is not the best way to learn marketing decision making. Instead, students should experience marketing in a way that leaves behind enduring lessons. Therefore, the best way for students to learn marketing engineering is to encourage them to use the software, to do the problems, and cases.

The software empowers students to solve marketing problems. We find that classes work best when we keep lectures to a minimum and have one or two student groups present their problem analyses to the rest of the class, which acts as (skeptical) management. This follows the learning-by-doing philosophy and makes students responsible for their own learning. It also simulates how marketing engineering works in the real world.

ACKNOWLEDGMENTS (2nd Edition)

As with the first edition, this book includes a text, software modules, tutorials, help files, problem sets, cases, a Web site and supplementary material. The creation of this portfolio was a major undertaking that could not have been accomplished without the support of many people and institutions.

We gratefully acknowledge the support of the companies that sponsor Penn State's Institute for the Study of Business Markets (ISBM—the book's co-publisher), and the ISBM's Executive Director and Marketing Engineering's chief cheerleader, Ralph Oliva, for the financial and institutional support needed to make this project a continuing reality.

The preface to the first edition of the book paid tribute to the many people whose intellectual contributions and hard work made that edition possible. We redouble our thanks to all who helped make the first edition possible and we single out below those who contributed specifically to this second edition.

An inspiring experience for us is the steadfast support of the many colleagues who have adopted the book and are our ambassadors. We know there would be no second edition of the book without them. Several of these ambassadors, including Chris Dubelaar, Josh Eliashberg, Ujwal Kayande, Vijay Mahajan, Carl Mela and Liz Wilson, have contin-

ued to provide helpful comments and suggestions (many of which we have implemented). We thank the students in our classes at Penn State and those in courses elsewhere who have been persistent in their demands that we keep improving the software.

While we continue to write portions of the software, we are involved more in design and testing than in actual coding. Our chief software engineer, Andrew "Nuke" Stollak, together with Laurent Müllender and Daniel Soto-Zeevaert wrote most of the new code (and developed the Web site) for the second edition. We also acknowledge the continuing contributions of Animesh ("Conjoint man") Karna. Two new additions to our team, Srikant Vadali and Vishwanath Ramrao, are enhancing our algorithms and making them more scalable and robust. We offer special thanks to Jean-Marie Choffray, who takes great pleasure in reminding us that software is never done, only abandoned. He has provided a flow of high-quality programming talent from the University of Liège, Belgium, to make sure that our software is not abandoned.

Bruce Kaplan and the staff at Prentice Hall continue to nurture this rather unusual project, helping us transform our concepts into physical reality. Grace Sikorski, Ray Liddick and Michelle Richardson provided very able copyediting and production support.

Finally, we offer special thanks to Mary Wyckoff who, once again, supported and managed the whole process. She continues to put up with our unreasonable demands and unrealistic deadlines and does so with unfailing good humor.

Behind every book is a generous group of family and friends. So it is in our case. In particular, our wives and daughters just let us be who we are, and for that, we are eternally grateful.

This book and related material represent a highly collaborative effort and our contributions are intimately intertwined. We continue to enjoy that collaboration, learn from each other, and marvel at the value of positive synergies.

Gary L. Lilien
Arvind Rangaswamy

About the Authors

GARY L. LILIEN

Gary L. Lilien, who coined the term *marketing engineering*, is Distinguished Research Professor of Management Science at the Smeal College of Business at Penn State. He is also co-founder and Research Director of the Institute for the Study of Business Markets at Penn State, an organization aimed at fostering research and interchange in nonconsumer markets. He holds three degrees in operations research, from the School of Engineering at Columbia University. Previously, Prof. Lilien was a member of the faculty at the Sloan School at MIT. His research interests are in marketing engineering, market segmentation, new product modeling, marketing-mix issues for business products, bargaining and negotiations, modeling the industrial-buying process and innovation-diffusion modeling.

Prof. Lilien is the author or co-author of 12 books (including *Marketing Models* with Philip Kotler) and over 80 professional articles. He was Departmental Editor for Marketing for Management Science; is on the editorial board of the *International Journal for Research in Marketing* and the *Journal of Business to Business Marketing*; is Functional Editor for *Marketing for Interfaces*, and is Area Editor for *Marketing Science*. He is former Editor in Chief of Interfaces. He served as President as well as Vice President/Publications for the Institute of Management Sciences. He is U.S. Coordinator for the European Marketing Academy.

Prof. Lilien is a winner of the Alpha Kappa Psi award for the outstanding article in the Journal of Marketing and is the Philip M. Morse Distinguished Lecturer of the Institute for Operations Research and the Management Sciences (INFORMS), 2001–2003. He received honorary doctorates from the University of Liège, the University of Ghent, and Aston University.

Prof. Lilien's consulting clients include AT&T, DuPont, Exelon, the Federal Reserve Bank, Hewlett-Packard, IBM, Kodak, Pillsbury, PP&L, Sprint, 3M, and Xerox.

Prof. Lilien is three-time winner and seven-time finalist in the Penn State Squash Club Championship and has substantial collections of fine wines and unusual porcine objects.

ARVIND RANGASWAMY

Arvind Rangaswamy is the Jonas H. Anchel Professor of Marketing at Penn State, where he is also co-founder and Research Director of the eBusiness Research Center. He received a PhD in marketing from Northwestern University, an MBA from the Indian Institute of Management, Calcutta, and a B.Tech from the Indian Institute of Technology, Madras. Before joining Penn State, he was a faculty member at the J. L. Kellogg Graduate School

of Management, Northwestern University, and at the Wharton School, University of Pennsylvania. He is actively engaged in research to develop concepts, methods, and models to improve the efficiency and effectiveness of marketing using information technologies, including such topics as marketing modeling, online customer behavior, and online negotiations.

Prof. Rangaswamy has published numerous articles in such leading journals as *Marketing Science*, the *Journal of Marketing Research*, *Management Science*, the *Journal of Marketing*, the *International Journal of Research in Marketing*, *Marketing Letters*, *Psychometrika*, *Multivariate Behavioral Research*, and the *Journal of Economics and Statistics*. He is Area Editor for *Marketing Science* and serves on the editorial boards of the *Journal of Interactive Marketing*, the *International Journal of Intelligent Systems in Accounting, Finance and Management*, the *Journal of Service Research*, and the *Journal of Business-to-Business Marketing*.

Prof. Rangaswamy is a Fellow of the IC^2 Institute, an IBM Faculty Partner, and the Chair of the e-Business Section of the Institute for Operations Research and the Management Sciences (INFORMS). He is the Program Director for Electronic Markets and Marketing Information Systems and a member of the Advisory Board at Penn State's Institute for the Study of Business Markets.

Prof. Rangaswamy has consulted for a number of companies including Marriott, Xerox, IBM, Kodak, Nokia, PPG Industries, AT&T, TVS (India), Bristol-Myers Squibb, Walker Digital, and Peapod.

Prof. Rangaswamy is an avid and successful trader on eBay and other auctions, where he blends his research with his personal interest in rare Indian stamps and postal history.

简 明 目 录

Contents