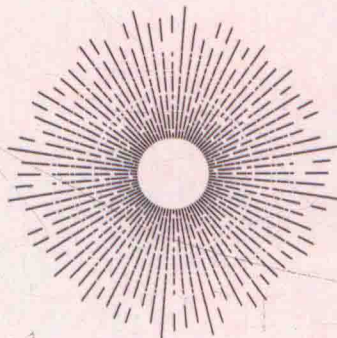


Mc
Graw
Hill
Education

Juran's
Quality Management and Analysis

朱兰 质量管理与分析

[美] 约瑟夫 A. 德费欧 (Joseph A. De Feo) 主编
弗兰克 M. 格里纳 (Frank M. Gryna)



英文影印版·原书第 ⑥ 版

朱兰博士的继任者、朱兰研究院院长德费欧先生最新力作
《朱兰质量手册》共同作者德费欧先生与格里纳博士共同编写
质量管理领域的经典名著



机械工业出版社
CHINA MACHINE PRESS

朱兰质量管理与分析

Juran's Quality Management and Analysis

英文影印版·原书第6版

[美] 约瑟夫 A. 德费欧 (Joseph A. De Feo) 主编
弗兰克 M. 格里纳 (Frank M. Gryna)



机械工业出版社

本书内容涵盖了质量管理的关键概念、主要方法和工具,介绍了制造业和服务业的质量管理及质量管理统计和数据分析等方面的知识。书中既有关于战略、文化等层面的质量管理,也包括流程、方法、工具的应用。本书包含大量图表和鲜活案例,并附有详细的参考书目,可作为广大质量工作者、一般管理人员以及高校学生学习质量管理、应用质量管理的参考用书。

Joseph A. De Feo, Frank M. Gryna
Juran's Quality Management and Analysis
978-0-07-352344-6

Copyright © 2015 by McGraw-Hill Education.

All Rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including without limitation photocopying, recording, taping, or any database, information or retrieval system, without the prior written permission of the publisher.

This authorized English reprint edition is jointly published by McGraw-Hill Education and China Machine Press. This edition is authorized for sale in the People's Republic of China only, excluding Hong Kong, Macao SAR and Taiwan.

Copyright © 2015 by McGraw-Hill Education and China Machine Press.

版权所有。未经出版人事先书面许可,对本出版物的任何部分不得以任何方式或途径复制或传播,包括但不限于复印、录制、录音,或通过任何数据库、信息或可检索的系统。

本授权英文影印版由麦格劳-希尔(亚洲)教育出版公司和机械工业出版社合作出版。此版本经授权仅限于中华人民共和国境内(不包括香港特别行政区、澳门特别行政区和台湾地区)销售。

版权© 2015 由麦格劳-希尔(亚洲)教育出版公司所有。

本书封面贴有 McGraw-Hill Education 公司防伪标签,无标签者不得销售。

北京市版权局著作权合同登记号:图字 01-2015-4155。

图书在版编目(CIP)数据

朱兰质量管理与分析:英文/(美)德费欧(De Feo, J. A.), (美)格里纳(Gryna, F. M)
主编. —北京:机械工业出版社, 2015. 12

书名原文: Juran's Quality Management and Analysis
ISBN 978-7-111-52485-4

I. ①朱… II. ①德…②格… III. ①质量管理-英文
IV. ①F273.2

中国版本图书馆CIP数据核字(2015)第302571号

机械工业出版社(北京市百万庄大街22号 邮政编码100037)

策划编辑:裴 泱 责任编辑:裴 泱
封面设计:张 静 版式设计:张文贵
责任校对:裴 泱 责任印制:乔 宇
保定市中国画美凯印刷有限公司印刷

2016年1月第1版·第1次印刷
184mm×245mm·48印张·1172千字
标准书号:ISBN 978-7-111-52485-4
定价:138.00元

凡购本书,如有缺页、倒页、脱页,由本社发行部调换

电话服务

服务咨询热线:(010) 88361066

读者购书热线:(010) 68326294

(010) 88379203

封面无防伪标均为盗版

网络服务

机工官网:www.cmpbook.com

机工官博:weibo.com/cmp1952

教育服务网:www.cmpedu.com

金书网:www.golden-book.com

前 言

我们告别了生产率的时代，进入了质量的时代。在21世纪的前10年，质量管理领域发生了激动人心的变化。为了满足用户不断变化的需求，传统的质量管理活动已经融入了企业的其他职能中。质量管理相关的职业团体、专业网站、图书、论文、评奖和咨询机构都呈指数级增长。大多数增长都归因于各种组织为了满足新的全球化驱动的用户和市场需求。这些组织还必须在以服务驱动经济、全球化虚拟供应链、大规模定制和飞速变化的技术为特征的竞争中表现卓越。

我们的用户需要产品的安全性、质量、可靠性、成本、及时性和大规模供货的完美结合，这种需求已成为常态。如果不能满足用户的需求，无法实现高绩效目标，就会带来企业经营业绩的下滑。我们也曾目睹了罕见但危险的失误，使得企业登上新闻头条，对品牌声誉造成重大打击。我们把这归因于质量不良。这也是质量从业人员存在的原因——阻止这样的事情发生。

第6版为寻找建立企业质量管理体系的正确方法的从业人员进行了改写。新版关注的不是关于产品规范，也不是关于统计方法，而是关于如何运用它们来获得质量优势，保证经营成果。本书是关于“大质量”的，正如朱兰博士所提出的。在本书中，“大质量”是关于如何使整个组织获取质量优势。本书为提供产品和服务的组织而写，为改善质量过程、质量体系、质量组织和质量管理的领导而写。换句话说，本书是一本关于利用质量驱动进行企业转型的书。

本书的读者对象包括：

- 管理类和工程类专业的学生，本书可作为他们学习质量管理课程的专业基础课教材，也可作为运营管理和工业工程专业学生学习质量管理的专业课教材。
- 参与诸如卓越绩效、卓越运营、六西格玛部署和精益生产等持续改进计划的管理人员和从业人员。
- 质量主管、质量经理、工程师以及准备参加注册质量工程师、质量经理、软件质量工程师和可靠性工程师等认证考试的考生。
- 六西格玛黑带和绿带，本书可作为黑带和绿带参加培训和准备认证的基础教材，黑带大师也能从本书中追求企业质量领先的概念、工具和方法的坚实基础中受益。

第6版的特点：

- 建立集成业务管理系统，以获得优秀的可持续的绩效。
- 新增了内容，包括：精益生产、六西格玛改善、质量设计、六西格玛设计、质量风险

评价、员工敬业度、企业保证和展望。

- 更新了真实的商业项目案例。
- 一个全面的案例分析，展示了精益六西格玛在美国食品与药品监督管理局监察的生物技术环境的防错流程文档中的应用。
- 使用 MINITAB 软件分析数据并解决问题，使用的例子都是真实的。
- 为使用本书的教师和学生提供网站支持，能够在网站上使用数据集、布置作业，并提供链接供深入学习和参考使用。

另外，本书还提供完整的教师手册，包括习题答案、附件的案例分析及答案，书中的增补关键数据也可在网站获得。

我们希望你能接受这些变化并从本书中受益。

约瑟夫 A. 德费欧

第6版致谢

我们要感谢对这一版做出贡献的人。没有他们，我们不可能提供一个如此宽广的质量视野。

约翰·恩利、凯文·考德威尔、布瑞恩·斯韦恩、查尔斯·奥布里、约瑟夫 M. 德费欧、布拉德·伍德参与了本书的编写。

蒂娜·皮尔特拉斯季维奇和迈克尔·玛诗进行了审查和编辑工作。

此外，我们还要一如既往地感谢朱兰博士和格里纳博士为我们提供了学习质量管理方法的机会，并且给我们提供了发展新方法和手段的空间。

Preface

We have entered the century of quality; we leave a century of productivity. The first decade of this century has resulted in dramatic changes in the field of managing for quality. There has been a surge of growth in performance excellence initiatives. The traditional quality management activities have become integrated with other functions to meet the changing needs of our customers. Professional societies, the many websites devoted to quality, publication of books and papers, awards, and consultancies have all grown exponentially. Much of this growth can be attributed to the need of our organizations to meet the new globally driven customer and marketplace. Organizations must excel in a competitive world that features a service-driven economy, global and virtual supply chains, mass customization, and technology that seems to change in a nanosecond.

Our customers demand perfection in safety, quality, reliability, and cost, and timely performance and delivering large quantities are now the norm. Failure to meet such needs and high-performing goals will produce declines in business performance. At times, we have seen rare and critical failures that make headlines and cause significant declines in brand reputation. We refer to this as poor quality. It is the reason the quality practitioners exist—to prevent these events from happening.

This edition has been rewritten for the practitioners who search to find the right methods to create an enterprise quality management system to make quality happen. This new edition is not about meeting product specifications; it's not about statistical techniques. It is about how to use them to attain superiority in quality and sustain business results. This book is about “Big Q,” as Dr. Juran referred to it. In this book, “Big Q” is about what it takes for an entire organization to manage for superiority in quality. It is for goods and service organizations. It is for improving the quality of processes, systems, organizations, and leaders. In other words, this book is about enterprise transformation using quality as the driver.

This book was written for:

- Business and engineering students, both as an introductory text to the subject of managing for quality and as an advanced text in quality management for those specializing in operations management or industrial engineering.
- Managers and practitioners of ongoing improvement initiatives such as Performance Excellence, Operational Excellence, Six Sigma, and Lean.
- Quality directors, managers, and engineers, including those preparing for the certification examinations such as the Certified Quality Engineer, Quality Manager, Software Quality Engineer, and Reliability Engineer.
- Black Belts and Green Belts—this book serves well as the primary text for Black Belts and

Green Belts as they undergo training and pursue certification. Master Black Belts will also find this book useful in providing a solid grounding in the concepts, tools, and techniques for attaining enterprise quality leadership.

New features of this edition include:

- Developing an integrated business management system to attain superior and sustainable performance.
- New and expanded topics, including Delivering Quality with Lean; Six Sigma Improvement; Design for Quality; Design for Six Sigma; Lean; Quality Risk Assessment; Employee Engagement; and Enterprise Assurance; A Look Ahead.
- Updated and showcased real business project examples and presentations.
- A case study showcasing the application of Lean Six Sigma to error-proof process documentation in an FDA-regulated biotech environment.
- A more extensive treatment of hypothesis testing, including a hypothesis testing road map to guide practitioners in the choice of statistical tests. This can add value to Six Sigma Experts, Green Belts, and Black Belts.
- Use of MINITAB software to analyze data and solve problems. Real-world examples using MINTAB are featured.
- A website for instructors and students to access data sets, homework assignments, and web links for further study and reference.

In addition, a full Instructor's Manual is available, containing solutions to all problems and additional case studies and their solutions. Enlargements of key figures from the book are on the website.

We hope you will agree with the changes and find this textbook useful.

—J. A. De Feo



ACKNOWLEDGMENTS FOR THE SIXTH EDITION

We would like to thank the following contributors to this edition. Without them we would not be able to provide a broader view of quality.

John Early, Kevin Caldwell, Brian Swayne, Charles Aubrey, Joseph M. De Feo, and Brad Wood co-authored some of the chapters. Tina Pietraszkiewicz and Michelle Matschke provided needed review and edits.

And, as always, our thanks go to Dr. Juran and Dr. Gryna for providing us the opportunity to learn the methods of managing for quality while allowing us the leeway to move to new methods and the means to apply it.

关于作者

约瑟夫 A. 德费欧 (Joseph A. De Feo)

德费欧现任朱兰研究院院长兼 CEO (首席执行官), 主要从事质量管理、精益生产、六西格玛部署、战略规划和业务流程管理领域的咨询、培训和出版工作, 拥有 35 年的丰富职业经验, 其从业经历涵盖消费品、零售、电子、化工、航空航天、汽车制造、半导体, 以及中等教育和高等教育等多个行业, 在各类期刊和网络上发表了 100 多篇论文, 还担任《六西格玛论坛》杂志的顾问。

德费欧与朱兰研究院前副院长, 威廉 W. 伯纳德 (William W. Barnard) 博士合著了《朱兰研究院的六西格玛: 突破与超越》一书, 于 2003 年 10 月出版, 该书是最早全面介绍朱兰研究院的质量管理理念和方法的教材之一。德费欧还参与了《朱兰质量手册》(第 6 版) 的编写, 该书旨在帮助质量管理从业者和管理者运用六西格玛工具得到理想的、可持续的结果, 该书的特色是“朱兰三部曲”——质量计划、质量控制和质量改进在绩效改善中的应用。

弗兰克 M. 格里纳 (Frank M. Gryna)

格里纳拥有工业工程博士学位, 并且在质量管理、质量技术和质量统计领域从事了 50 多年的研究工作。1991—1999 年, 他担任坦帕大学质量中心主任, 是管理学杰出教授。1982—1991 年, 他担任朱兰研究院高级副院长。在 1982 年之前, 他担任布拉德利大学工程技术学院常务副院长, 教授工业工程, 被授予工业工程荣誉退休教授。此外, 他还在质量和可靠性领域为多家公司提供从最初设计到现场应用方面的咨询。

格里纳曾任职于美国陆军信号工程实验室和埃索 (ESSO) 研究和工程公司, 并曾在马丁公司的空间系统部门担任可靠性和质量保证经理。

格里纳与朱兰博士合著了《质量策划与分析》, 并且担任了《朱兰质量手册》第 2 版、第 3 版和第 4 版的副主编。他基于所研究项目的著作——《质量圈》, 在一个由美国工业工程师协会和多家出版商主办的评比中被评为“年度最佳图书”。

格里纳是美国质量协会会员、美国工业工程师协会会员、注册质量工程师和可靠性工程师、专业工程师 (质量工程)。他曾获得美国质量协会的 E. L. 格兰特奖、皮奥里亚工程委员会的年度最佳工程师奖、工业工程师协会质量控制与可靠性工程分会的杰出表现奖, 他还是美国质量协会大都会区举办的奥特基金会奖的获得者。

About the Authors

JOSEPH A. De Feo is President and Chief Executive Officer of Juran Global. Mr. De Feo is an author, executive coach, and performance improvement practitioner. Among his areas of expertise are the Management of Quality, Lean, and Six Sigma Deployment; Strategic Planning; and Business Process Management methodologies.

Mr. De Feo's 35 years of experience comes from a wide range of industries, including consumer products, retail, electronics, chemical processing, aerospace, automotive, semiconductors, and both secondary and higher education.

Mr. De Feo has published more than 100 papers in national and international publications, including many web-based publications. He serves on the advisory boards of Six Sigma Forum magazine and FarmAid.

Mr. De Feo is the co-author of Juran Institute's *Six Sigma: Breakthrough and Beyond* with Dr. William W. Barnard, past senior vice president of the Institute. Published in October 2003, the book was one of the first management texts to present the full philosophy and methodology of Juran Institute. Mr. De Feo also co-authored the 2010 publication of Juran's *Quality Handbook 6th Edition, The Complete Guide to Performance Excellence*; the "go to" resource for deployment leaders. With the goal of helping practitioners and leaders learn to move beyond their initial Six Sigma efforts to achieve sustainable bottom line results, the book features performanceimproving applications based on the Juran Trilogy of planning processes, controllingprocesses, and systematically achieving breakthrough improvement in processes.

FRANK M. GRyna, Ph. D., had degrees in industrial engineering and more than 50 years' experience in the managerial, technological, and statistical aspects of quality activities.

From 1991 to 1999 he served first as director of the Center for Quality and then as Distinguished University Professor of Management at the University of Tampa. From 1982 to 1991, he was with the Juran Institute as senior vice president. Prior to 1982, Dr. Gryna was based at Bradley University, where he taught industrial engineering and served as acting dean of the College of Engineering and Technology. Prior to his passing, he was Distinguished Professor of Industrial Engineering Emeritus. In addition, he had been a consultant for many companies on all aspects of quality and reliability programs from initial design through field use.

Dr. Gryna also served in the U. S. Army Signal Corps Engineering Labs and the Esso

Research and Engineering Company. At the Space Systems Division of the Martin Company, he was manager of reliability and quality assurance.

He co-authored *Quality Planning and Analysis* with J. M. Juran and was associate editor of the second, third, and fourth editions of *Juran's Quality Handbook*. His research project, *Quality Circles*, received the Book of the Year Award sponsored by various publishers and the Institute of Industrial Engineers. He received recognitions as a Fellow of the American Society for Quality, a Fellow of the Institute of Industrial Engineers, a Certified Quality Engineer, a Certified Reliability Engineer, and a Professional Engineer (Quality Engineering). He also received various awards, including the E. L. Grant Award of the American Society for Quality, Engineer of the Year Award of the Peoria Engineering Council, teaching and professional excellence awards, and the Award of Excellence of the Quality Control and Reliability Engineering Division of the Institute of Industrial Engineers. Dr. Gryna was also the recipient of the Ott Foundation Award, presented by the Metropolitan Section of the American Society for Quality.

Contents

Preface

About the Authors

Introduction

1 The Bottom Line: Quality and Business Performance	5
1.1 Why Quality Management? A Brief History Lesson	5
1.2 Quality and Its Impact on Financial Performance	7
1.3 Integrated Quality System Defined	9
1.4 The Quality Function	11
1.5 Relationship of Quality to Productivity, Costs, Cycle Time, and Value	13
1.6 Universal Principles for Managing for Quality	15
1.7 Quality Disciplines and Other Disciplines	17
1.8 The Way Forward—Developing a System Plan for Success	18
Summary	19
Problems	19
References	20
2 Integrating Quality into the Enterprise Strategic Plan	21
2.1 Quality and the Strategic Plan	21
2.2 A Strategic Planning Model	23
2.3 Developing a Mission and Vision	25
2.4 Developing Long-Term Strategies	28
2.5 Development of Short-Term Annual Goals	30
2.6 Deployment of Goals—Hoshin Kanri	34
2.7 Leadership to Implement the Strategies	36
2.8 Review Progress Assessments, Audits, and a Balanced Scorecard	39
2.9 Review and Refresh the Plan	39
2.10 Obstacles to Achieving Goals	41
Summary	43
Problems	44
References	44

目 录

前言

关于作者

引言

1 概要：质量与绩效	5
1.1 为什么需要质量管理？质量管理简史	5
1.2 质量及对财务绩效的影响	7
1.3 集成质量体系的定义	9
1.4 质量活动	11
1.5 质量与生产率、成本、周期、价值的关系	13
1.6 质量管理的一般原则	15
1.7 质量规范及其他规范	17
1.8 发展的途径——制订面向成功的系统计划	18
小结	19
思考题	19
参考文献	20
2 将质量融入企业战略规划	21
2.1 质量与战略规划	21
2.2 一个战略规划的典范	23
2.3 确定使命与愿景	25
2.4 制定长期战略	28
2.5 短期年度目标的制定	30
2.6 目标分解落实——方针管理	34
2.7 加强对战略执行的领导	36
2.8 评审过程评价、审核与平衡计分卡	39
2.9 回顾并调整规划	39
2.10 完成目标的障碍	41
小结	43
思考题	44
参考文献	44

3	Organizationwide Assessment of Quality	47
3.1	Why Assess Performance?	47
3.2	Quality Risk Assessment	47
3.3	Strategic Alignment, Deployment, and Assessment	48
3.4	Plan the Assessment	51
3.5	Cost of Poor Quality	53
3.6	Categories of Quality Costs	55
3.7	Relating the Cost of Poor Quality to Business Measures	61
3.8	Optimum Cost of Quality	62
3.9	Assessment and Standing in the Marketplace	64
3.10	Assessing Using National Performance Standards and Awards	67
3.11	Baldrige Scoring System	72
3.12	Using Quality Awards as a System Assessment Tool	73
3.13	Assessing to the International Standards	75
3.14	Quality System Certification/Registration	78
3.15	Industry-Specific Adoptions and Extensions of ISO 9000 Standards	79
3.16	Benchmarking Best Practices; Moving Toward Sustainability	85
3.17	Benchmarking; What it is and What it is Not	89
3.18	Internal and External Competitive and Noncompetitive Benchmarking(Who)	93
3.19	Data and Information Sources (How)	95
3.20	Data Normalization	98
3.21	Analysis and Identification of Best Practices	100
	Summary	101
	Problems	102
	References	103
4	Improving Quality While Decreasing Cost	105
4.1	Lean Six Sigma as a Breakthrough Improvement Model	105
4.2	Breakthrough Improvement; Project-By-Project Approach	107
4.3	Six Sigma Improvement Project Example	107
4.4	The Business Case for Quality Improvement	110
4.5	Lessons Learned with the Project-By-Project Approach	111
4.6	Lean and Six Sigma Improvement	112
4.7	Define Phase	114
4.8	Measure Phase	118

3 组织范围的质量评价	47
3.1 为什么要评价绩效?	47
3.2 质量风险评价	47
3.3 战略的调整、战略部署及战略评价	48
3.4 评价安排	51
3.5 劣质成本	53
3.6 质量成本的类型	55
3.7 关联劣质成本与业务衡量	61
3.8 优化质量成本	62
3.9 评价与市场地位	64
3.10 通过国家绩效标准和质量奖进行评价	67
3.11 波多里奇评分系统	72
3.12 通过质量奖进行系统评价	73
3.13 评价的国际标准	75
3.14 质量体系认证/注册	78
3.15 ISO9000 标准在不同行业的应用和发展	79
3.16 标杆最佳实践: 实现可持续性	85
3.17 标杆是什么? 标杆不是什么?	89
3.18 标杆: 内部和外部, 竞争性和非竞争性 (谁是标杆)	93
3.19 数据和信息源 (如何确定标杆)	95
3.20 数据标准化	98
3.21 最佳实践的分析和鉴定	100
小结	101
思考题	102
参考文献	103
4 改进质量与降低成本	105
4.1 精益六西格玛: 突破性改进工具	105
4.2 突破性改进: 逐项计划处理法	107
4.3 六西格玛改进项目案例	107
4.4 质量改进的应用案例	110
4.5 由逐项计划处理法学到的	111
4.6 精益和六西格玛改进方法	112
4.7 定义阶段	114
4.8 测量阶段	118

4.9	Analyze Phase	125
4.10	Improve Phase	140
4.11	Control Phase	147
4.12	Lean Six Sigma Summary and Project Example	148
4.13	Maintaining a Focus on Continuous Improvement	155
	Summary	160
	Problems	160
	References	163
5	Quality by Design to Increase Sales	165
5.1	Contribution of Quality to Sales Income	165
5.2	Quality and Financial Performance	166
5.3	Achieving Marketplace Superiority	167
5.4	Customer Satisfaction Versus Customer Loyalty	169
5.5	Customer Loyalty and Retention	169
5.6	Economic Worth of a Loyal Customer	173
5.7	Impact of Poor Quality on Lost Sales	174
5.8	Level of Satisfaction to Retain Present Customers	175
5.9	Life-Cycle Costs	176
5.10	Spectrum of Customers	177
5.11	The Quality by Design Road Map	178
5.12	Quality by Design (QbD) and Design for Six Sigma (DFSS)	184
	Summary	190
	Problems	191
	References	191
6	Control of Quality to Maintain Superior Performance	193
6.1	Compliance and Control Systems	193
6.2	The Importance of Information and Measurement	194
6.3	The Ultimate Inspector: Self-Managed Processes	196
6.4	Understanding What Is Critical to Control	198
6.5	Establish Measurement and Establish Standards of Performance	199
6.6	Measure Actual Performance	206
6.7	Compare to Standards	207
6.8	Take Action on the Difference	211

4.9	分析阶段	125
4.10	改进阶段	140
4.11	控制阶段	147
4.12	精益六西格玛总结和项目案例	148
4.13	对持续改进保持关注	155
	小结	160
	思考题	160
	参考文献	163
5	质量源于设计 (QbD) 对于提高销量	165
5.1	质量对销售收入的贡献	165
5.2	质量与财务绩效	166
5.3	获得市场优势	167
5.4	顾客满意对比顾客忠诚	169
5.5	顾客忠诚和顾客维系	169
5.6	忠诚顾客的经济价值	173
5.7	质量不良对销售损失的影响	174
5.8	维护现有顾客的满意度等级	175
5.9	生命周期成本	176
5.10	顾客群体分析	177
5.11	面向质量的设计	178
5.12	质量源于设计 (QbD) 与六西格玛设计 (DFSS)	184
	小结	190
	思考题	191
	参考文献	191
6	为保持卓越绩效的质量控制	193
6.1	合规与控制系统	193
6.2	信息与测量的重要性	194
6.3	终极监管: 自我管理过程	196
6.4	了解需要控制的关键点	198
6.5	绩效测量体系和绩效基准的建立	199
6.6	测量实际绩效	206
6.7	绩效基准比较	207
6.8	对质量差异采取行动	211

6.9	Developing Process Control	213
	Summary	214
	Problems	214
	References	215
7	Business Process Management	217
7.1	Functional Versus Business Process Management	217
7.2	Business Process Management	218
7.3	Selection of Processes	219
7.4	Organize the Process Team	221
7.5	Example of Business Process Management	221
7.6	The Planning Phase of Business Process Management	222
7.7	Transferring and Managing the New Process	232
7.8	Impact of Business Process Management on an Organization	232
	Summary	234
	Problems	234
	References	235
8	Organization Roles to Support a Quality Culture	237
8.1	Evolution of Organization for Quality	237
8.2	Role of the Quality Office	238
8.3	Organizing the Quality Office of the Future	241
8.4	Role of Upper Management	249
8.5	Role of the Quality Director	251
8.6	Role of Management	255
8.7	Role of the Workforce	256
8.8	Role of Teams	256
8.9	Training and Certification of Personnel	258
	Summary	261
	Problems	262
	References	262
9	Creating a Quality Culture	265
9.1	Corporate Culture	265
9.2	Quality Culture	266