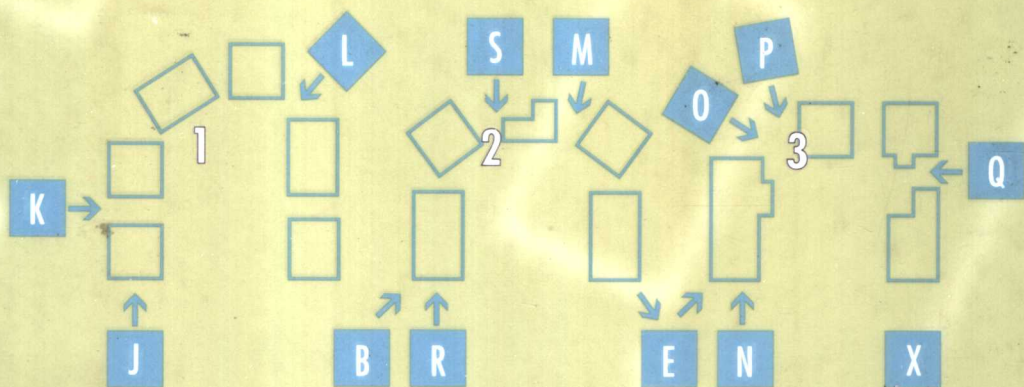


COMPETITIVE MANUFACTURING MANAGEMENT

CONTINUOUS IMPROVEMENT,

LEAN PRODUCTION, AND

CUSTOMER-FOCUSED QUALITY



J O H N
N I C H O L A S

COMPETITIVE MANUFACTURING MANAGEMENT

Continuous Improvement
Lean Production
Customer-Focused Quality

John M. Nicholas

Loyola University Chicago

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PREFACE

Around 1989, after having talked to some former students who had become practitioners and consultants in manufacturing and having read Richard Schonberger's *World-Class Manufacturing: The Lessons of Simplicity Applied* (The Free Press, 1986), Robert Hall's *Zero Inventories* (Dow Jones-Irwin, 1983), and Kiyoshi Suzaki's *The New Manufacturing Challenge* (The Free Press, 1987), I decided to offer a course for operations management majors focused exclusively on just-in-time (JIT) and total quality management (TQM). While developing the curriculum, I encountered what seemed to be three difficulties: JIT and TQM are two very broad topics, they are highly interrelated, and there was no textbook.

Some people equate JIT and TQM with production and quality control techniques. In fact each is a complete management philosophy that encompasses not only techniques but also convictions about the role of workers and how to treat employees and suppliers. The volume of journal literature about JIT and TQM was enormous.

Having grasped the expanse of the subject areas, I decided to focus only on JIT. I soon

learned, however, that JIT and TQM are highly related and that (as explained in Chapter 4) you cannot completely understand JIT without also somewhat understanding TQM. To cover JIT, I would also have to cover aspects of TQM.

I then set out to find a textbook. At the time there were a few textbooks on TQM and some trade books on JIT, but the TQM books were not about JIT, and the JIT books were written for practicing managers in a style and at a level inappropriate for college students. Hence, to the chagrin of my class, the required material for the course came to consist of a TQM textbook, a JIT trade book, and a packet of journal articles. Trade books do not include homework questions and problems, so I had to prepare them on my own. Over the years I supplemented more and more of this material with my own writings. About the time that these writings covered half the topics in the course, I decided to write a book and put everything in one place.

At times it did seem as if, indeed, I was writing about *everything*, since JIT and TQM touch on virtually every aspect of management. To contain the size of the book and make sure I could finish it, I had to restrict the coverage of

many topics. (After all, I kept reminding myself, this is an *introductory* book on JIT and TQM, albeit an in-depth one.) There is much to know about these subjects, and I have included references in the endnotes for interested readers. You can also learn about manufacturing JIT and TQM from *Production and Inventory Management* and *Target*, the journals of the American Production and Inventory Control Society and the Association for Manufacturing Excellence, respectively.

Not long ago a friend, Avi Soni, asked me whether JIT is dead. This was based on his observation that the appearance of the term JIT in articles and seminars is declining. In the ensuing conversation we agreed that the reason for the decline is probably because concepts associated with JIT have been absorbed into mainstream production management and into what is now termed manufacturing excellence or competitive manufacturing. Management concepts seem to come and go with the seasons, but the important ones remain active, even though the terminology changes. Although Richard Schonberger, still among the most prolific and best writers in the field, seldom uses the term in his recent book *World-Class Manufacturing: The Next Decade* (The Free Press, 1996), familiar JIT concepts run throughout the book. JIT is alive and well. Avi Soni could question the status of JIT because the company where he is employed as a manager began the transition to JIT/TQM more than a decade ago and now has a JIT/TQM *modus operandi*. Folks at his plant do not think of what they are doing as innovative or different and probably not as JIT/TQM, *per se*.

In and around my city, Chicago, there are enough factories that one has ample opportunity to see both the best and the worst in manufacturing management. I have been excited and encouraged in visiting plants that have embraced continuous improvement, lean production, and customer-focused quality. Managers and workers in these plants display high enthu-

siasm in talking about what they are doing. Students of mine often express the same level of enthusiasm. Yes, they discover, JIT/TQM is cool—in a way. Some students (sometimes the same ones) also express frustration because of problems in their workplace and management's ignorance about JIT/TQM or unwillingness to change. I can relate to that, having visited plants that seem like throwbacks to 50 years ago and talked to workers who dislike their jobs and managers who are out of touch with the workforce and customers.

The management concepts and principles described in this book will guide manufacturing practice for the next few decades, at least. They have become very much a part of today's business, mostly because they work. Beyond that, I personally find some of the principles satisfying because of the somewhat high level of responsibility and dignity they attach to the jobs of workers on the shop floor. I was raised in a working-class family and always felt that my parents' abilities far exceeded what they could exercise in the workplace. My dad was one of the smartest and all-around most capable men I have ever known and I always thought he could build or fix anything requiring mechanical, electrical, or carpentry skill. When I think about teams of workers in JIT/TQM organizations, I envision people like my parents, for certainly they are representative of many millions of workers. That is not to say that JIT/TQM organizations are a kind of utopia, but that, on balance, workers in JIT/TQM factories have more opportunity to find meaning in their jobs and to get more earned respect from management than workers in other factories.

Einstein said, "I know why there are so many people who love chopping wood. In this activity one immediately sees the results." JIT and TQM practices are that way too. Both represent pragmatic approaches to chopping away at waste and problems in organizations. In many factories you can start to see results on the shop floor not too long after putting aspects of JIT

and TQM into practice (improvements on the balance sheet happen too, but they take a little longer).

AUDIENCE AND USE OF THIS BOOK

Competitive Manufacturing Management was written for three audiences:

1. Bachelor of business and MBA students *majoring* in production and operations management.
2. Industrial and manufacturing engineering students.
3. Practicing manufacturing managers and engineers seeking an understanding of JIT/TQM.

It is intended for a second-level course in production and operations management. Students who have already taken an introductory course should be readily able to understand the material.

It will be difficult to cover all of this book in depth in a typical one-term college course, and

the instructor must decide on which topics to focus. The book is divided into an introductory chapter and five main parts. Chapter 1 and Part I provide foundation concepts for everything that follows. Part II covers lean production and core concepts of JIT manufacturing. I believe that everything in this part should be covered in some depth. Part III is about design quality and manufacturing quality control. In schools that offer courses in TQM and SPC, portions of this part may be scanned or deleted. Chapters 12 and 15, however, should be read since they describe concepts used in later chapters. Part IV covers integrated planning and control in pull production—another key aspect of JIT. Depending on students' prior exposure to planning and control, however, portions of this part may also be scanned or deleted. Part V covers topics important to the success of JIT/TQM but not usually included in a manufacturing book. At minimum, Chapter 19 should be read in full. My suggestion is to not completely skip any chapter. Most of the topics in this book are interrelated: to gain a full understanding of JIT/TQM, it is necessary to know about all of them.

John M. Nicholas

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In writing *Competitive Manufacturing Management* I have been fortunate to have had the assistance of many bright and capable people. Two are my friends and colleagues at Loyola University Chicago, Drs. James Zydiak and Enrique Venta who read many parts of this book and provided useful suggestions. Others who helped the most were my research assistants during the last 3 years, Sosamma Mammen, Marco Menaguale, Marlene Abeysinghe, and Omar Saner. In case you find the going difficult with some of what you will read, you can only imagine what it was like for them many drafts earlier. On the other hand, if perchance the material reads with exceptional clarity, it is no doubt partly due to their exceptional efforts. I also wish to credit Leslie Bailyn and Diane Petrozzo for their editing and gopher support, and Dr. Larry Metzger for reviewing and critiquing Chapter 20.

Thanks also to Mr. Avi Soni and Mr. Al Brouillette, two enthusiastic managers on the front lines and at the leading edge of manufacturing. I learned a great deal about JIT/TQM

from frequent visits to their plants and discussions with them and their co-workers.

I also want to acknowledge the reviewers of this book whose comments and suggestions greatly improved the end product: Mary Jo Maffei, formerly University of Cincinnati; Behnam Malakooti, Case Western Reserve University; Unny Menon, California Polytechnic State University; George Schneller, Baruch College—CUNY; Kenneth Ramsing, University of Oregon; Joe Biggs, California Polytechnic State University; Karen Donohue, University of Pennsylvania; Vaidyanathan Jayaraman, University of Southern Mississippi; Pitu Mirchandani, University of Arizona; Byron Finch, Miami University; and George Petrakis, University of Missouri.

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Finally there is my wife Sharry, who has my deepest appreciation for patiently assuming responsibility for managing virtually every aspect of our home life so I could work undistracted.

The assistance of so many people made writing this book not only doable but enjoyable. Most of them share with me an excitement about modern methods of manufacturing management. My one wish is that you, after having

read this book, come away with that same sense of excitement.

My apologies in advance for any typos and mistakes. I had final say over everything, so I accept responsibility for these as well as for any other source of anguish this book might cause. For your sake I hope there aren't too many, but I do appreciate hearing from you about them.

John M. Nicholas

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