

The New Manufacturing Challenge, Techniques for Continuous Improvement

by Kiyoshi Suzaki

a review by Alan Briggs

As a student and junior member of the operations management world, it is often difficult to determine good advice from bad. Without the time to implement every idea in every book, for me, the book-jacket endorsement can play a valuable role in assigning merit to a book's concepts. For this reason, Kiyoshi Suzaki's *The New Manufacturing Challenge*, instantly grabbed my attention with glowing praise from Deborah A. Coleman, a former CFO and Vice President of Worldwide Manufacturing Operations at Apple Computer, Inc. She remarks: "Truly outstanding...this book should become a dog-eared handbook in the back pocket of every operations manager worth his or her salt." It is not all too uncommon to see praise from a regional newspaper like the Houston Chronicle or an unknown executive from ABC, Inc. The fact that such a senior executive, in an iconic American organization, spoke so passionately about the book encouraged me to give it another glance.

Kiyoshi Suzaki himself is not a prolific writer, but what he has written has received tremendous praise. As a manufacturing consultant, he has traveled around the world helping organizations implement just-in-time production, total quality control and total productive maintenance concepts in their facilities. During the early years of his career, Suzaki was left with a simple question: How has blatant overcapacity, rampant overstaffing and excessive waste gone unnoticed by today's production engineers? While the book does not answer this question directly, I believe his question presents three major themes, each addressed within the book, and each worthy of reviewing—capacity, staffing and waste.

Capacity itself is an overwhelming topic. What is capacity? How much do we have? How much do we need? Throughout the book, capacity refers to all of these things, and the concept itself serves as a good umbrella over two key ideas. Principle among these is the idea of *flow*. In the context of the book, flow is really shorthand for *steady flow*. Suzaki points out that it is difficult to control constant change; therefore, we should constantly move toward a goal of perfect fluidity. My understanding of flow is best illustrated in a simple analogy. Consider two scenarios: a military march and a stoplight. On command to move forward, military personnel are all instructed to start off at the same time and with their left foot. This results in an entire group moving forward simultaneously. Contrarily, cars at a stoplight wait until the car in front of them has moved. The compounded effect of each individual driver's response time leads to a staggered start. If all cars in a lane were clued in to this simple detail and started moving at the same time, they could all move through a stoplight faster.

Suzaki first addresses the concept of flow in the fourth chapter (Developing Flow on the Production Floor), where he begins by saying that "problems are often caused by a lack of coordination and people's tendency to focus on their individual activities." I think Suzaki's definition is useful, and it is interesting that it does not exclude management. I take his definition to mean that all people, including management, focus on their individual tasks. The result is that there is seldom a group of individuals who are committed to looking at the

organization as a whole. At the end of the day, the ultimate goal of any production environment is to produce. To achieve maximum production, the primary focus must remain on the finished product, and cannot be usurped by its constituent operations along the way. As humans, it is very easy to view life through our own lens, and it is much more difficult to step back and look at the big picture. An excellent use of big picture thinking is creating a product-oriented as opposed to process-oriented layout. Product-oriented layouts can reduce transportation costs, excessive inventory, multiple handlings and long lead times. Perhaps the most compelling reason to make the switch is to facilitate easier work scheduling and prioritization, and to provide effective feedback about defects and other production information. I think most organizations suffer from a lack of effective communication. As individuals focus on their own part of the operation, the impetus to communicate with their peers is greatly diminished. By using the product as the focal point, instead of the various processes, employees will be induced to interact more with their upstream and downstream partners.

In addition to modifying the facility layout, significant opportunity for improvement exists in utilizing a mixed production schedule. As opposed to batch production, a mixed production schedule dictates scheduling production in a nearly on demand—or as ordered—manner. It has been demonstrated that customers typically consume products in certain patterns, and after some period of time, companies will be able to capitalize on these naturally occurring patterns. Granted, with mixed production, setups are more frequent, so there is a need to reduce setup times to ensure peak efficiency. But, by utilizing a mixed production schedule, inventory levels can be reduced, and there is a decreased risk of overproduction of any one product. Suzaki makes a good point, but given that so much material in the book revolves around reducing batch production, the case being made is a bit brief. There are several times throughout the book that Suzaki seems to say “if you can just do A (some monumental task), then B, C, D, E and F will fall into place. It somewhat discounts how difficult task A may be, and dismisses the number of problems that can arise between B and F.

Beyond flow, and as the second major component of capacity, Suzaki talks at length about process improvement. The manufacture of any given product is made up of a series of processes. By evaluating all of these processes together, and improving upon them as a system, increased efficiency can be achieved. One simple improvement noted in the book is to modify the shape of the line setup. When we picture a production line, many times we picture an actual *line*. The I-shape as it is also known has some serious deficiencies in the area of communication, which leads to decreased quality control and possible over-production. By organizing the production line in a U-shape, employees can communicate with their upstream and downstream partners more easily during the production process. This allows for better interaction between processes and ultimately better flow. For larger or more complicated operations, Suzaki goes through a more technical process to help evaluate material flow in a plant. By completing a product-quantity analysis, process route analysis and a grouping exercise, trouble spots can be highlighted. Then, by engaging in idea generation, possible solutions to the exposed problems can be considered and implemented. A problem I see with such a technical review is that it would be difficult to include employees in the process. Engineers would likely pull the data, run the computations and then report the findings to the employees for idea generation. This might play into a common criticism of consultancy, that the data is arbitrary and illegitimate.

Moving to the staffing theme; in the fifth chapter (Expanding Skills for Increased Flexibility), Suzaki begins with an explicit rebuke of Frederick Taylor's scientific management. "Rigid job descriptions restricting areas of responsibility—the Taylorist approach—hamper the coordination of the total production system." Suzaki takes issue with such a sterile view of employees, and alternatively, suggests expanding operator's flexibility, increasing skill sets and utilizing the "collective skill and experience" of the employees. In my opinion, this becomes a cornerstone to Suzaki's other recommendations. By definition, as efficiency is improved in the operation, more work can be completed with fewer resources. And, as employees make up the largest and most valuable resource, in the absence of employee cross-training and multi-functionality, their ability to be moved and re-utilized are limited, leading to their untimely dismissal. By effectively cross-training, employees can be redeployed into new aspects of the operation when their position is being eliminated. This has a dramatic effect on employee morale, and consequently productivity, as employees are not so gripped with fear of losing their job. Moreover, they are more likely to offer cost-saving tips to the company, since they are not concerned that they will be fired if their position is no longer needed.

In nearly all scenarios, progress is tantamount with employee commitment. For this reason alone, employees must be considered in every step of the improvement process. Suzaki emphasizes that "no system will work unless consideration is given to the people that are involved." Despite all the effort that management makes to have an impact on the process, their energy should be re-directed to have an impact on their people. After all, people are ultimately responsible for implementing the overwhelming majority of processes in an operation. A good way to include employees in the improvement process is by asking them a simple question: "what can be done to make your job easier." I think this question can go a long way in fostering good will with employees. It is far too easy as management to unknowingly discourage employee input, by putting on heirs that you cannot be bothered. Management are often times even convinced that their employees' comments are insincere, or even worse, ignorant to the big picture. In my experience, just asking for someone's opinion, even if you do not act on it, will make them feel better about the work that they do. And, if you really consider their idea, many times it is in fact a good idea, and it may present an opportunity to make the organization better. Perhaps the most important topic that *New Manufacturing Challenge* addresses—and, certainly the most relevant to lean manufacturing—is that of waste. In testament to its importance, the introductory chapter is succinctly titled: "Eliminating Waste." Borrowing from his contemporary Taiichi Ohno, Suzaki lists the seven common forms of waste in a corporation and then expounds upon them in some detail. Considered to be the most egregious form of waste, *overproduction* often results in excessive inventory, requiring storage capacity and additional handling. This inevitably interrupts an effective flow—perhaps the holy grail of efficient production. Overproduction is also considered so detrimental because it conceals so many other problems—like additional operators for inspection and inventory management; additional paper work; or more equipment. Another common waste can be found in extraneous *motion*. Perhaps this is where Suzaki and Taylor may find some common ground—movement does not equal work. A critical and scientific analysis of employee movements will likely expose areas of wasted effort, resulting in a more efficient operator.

In my current line of work, conveyors are exclusively used to move product throughout the facility. I was anxious to learn about them in chapter twelve (Redefining the Roles of

Conveyors and Transportation). Distinguishing between two types of conveyors, stationary and motor-driven, Suzaki points out that motor-driven conveyors “can be used to provide a rhythm for operators in their work,” while stationary conveyors often take up too much space and “store” too much inventory. Mechanized conveyors certainly have their drawbacks but these concerns can be easily mitigated with a few simple recommendations. First, transfer material only as fast as it is needed—allow for *pull*. Alternatively, transfer materials at specific intervals—predetermined points to prevent an enormous *push* of product through the system. Most importantly, the conveyor should be able to be stopped if problems are discovered. After much talk about exposing problems, it is important to address problems immediately and find a workable solution. Exposing problems and not correcting them does nothing to increase efficiency.

My assessment of *The New Manufacturing Challenge* is equally divided. The book should not be taken in isolation for it suffers from some real deficiencies. But, Suzaki offers tremendous insight into some very powerful, yet fundamental, concepts. My guess is that *any* manufacturing professional would be able to pick up Suzaki’s book, and find an idea that will save his or her organization money.

The book was written in 1987, and Suzaki’s frequent references to a need to adapt seem to portend some major changes in the manufacturing world. What we all know now is that his suspicions were quite accurate—a new global economy has arrived. After reading this book, I am left a bit empty, wondering if anything in its pages is even relevant. Intuitively, I know that it is, but globalization has become such a prodigious concept, that its absence from this text is both conspicuous and disconcerting. To be taken seriously, a new edition—with a prologue, new chapters, an epilogue, or something—is absolutely mandatory.

My second major criticism of the book, quite ironically, is its disjointed nature and lack of flow. As Suzaki is native Japanese, perhaps something was lost in translation. Or, maybe he fits the stereotype of an incredibly gifted engineer with an unfortunate, inferior skill in writing. Regardless, the organization of the book makes it very difficult to process. The summaries are notorious for interjecting single sentences that are new material and are not in fact covered in the preceding chapter. I was constantly thumbing back through the chapter to see if I had missed something.

All of that being said, as a complementary text book for a lean production class, the material could not be better. With references to all of the major themes in lean manufacturing at the time, including references to Taiichi Ohno himself, anyone interested in lean manufacturing would find a wealth of information. Although his descriptions are sometimes vague and difficult to follow, if nothing else, the book can provide interested students with a wonderful starting point—a springboard to go and research individual topics further. In sum, my review is net positive—I recommend *The New Manufacturing Challenge*. I do not recommend that someone sit down and read it cover to cover. I do not recommend that someone use it as their sole reference on lean manufacturing. But, as a fieldbook, a desk reference or as the catalyst for further research, this book will serve the prospective student of lean manufacturing quite well.