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THREE YARDS AND A CLOUD OF DUST: INDUSTRIAL MANAGEMENT AT CENTURY END

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After a decade of updating and modernizing U.S. manufacturing with advanced management techniques (AMTS), competitive results have been generally disappointing. Industrial managers under pressure have relied on AMTS to solve their problems, but in this era of ever more intense and fast-moving competition, this has generally proven inadequate. Competitors abroad have moved ahead just as vigorously and usually earlier in applying AMTS such as JIT, TQM, and MRP, so the result has been "competitive gridlock." Simultaneously, industry is full of misfits between manufacturing policies and strategy, as AMT-driven managers make and change policies piecemeal. The mediocre results of this conventional, operational mindset demonstrate that sheer productivity improvement or other conventional performance objectives seldom build unique competitive advantage. Winning in competition today requires a different management approach; one which is focused on establishing competitive superiority. Basic structural redesign is the key to clear competitive advantage, but its rare practice signals the presence of problems in the skills, attitudes, and premises of many industrial managers. Rather than continuing the common practice of relying on available AMTS, a new breed of industrial managers is needed, equipped with a breadth of skills which encompass all the functional areas of production and who are business- and strategy-rather than narrowly operation- and functionally-oriented.
(MANUFACTURING STRATEGY; PLANNING AND CONTROL TECHNIQUES; COMPETITIVE STRATEGY; MANAGEMENT DEVELOPMENT)

In the Manufacturing Roundtable report of September 1994, some 212 top-level industrial managers from a broad span of American industries describe the present dilemma of U.S. industry as that of "competitive gridlock" (Kim 1994). They report that despite a frantic and successful struggle to install advanced manufacturing techniques (AMTS) over recent years, their firms are still finding it difficult to compete in rapidly globalizing markets."

The authors' analysis of the data concludes that companies have "improved continuously and more intensively in many areas, but their competitive advantages appeared to be decreasing." The data indicates that "(our) competitive strength relative to major competitors has decreased over the last four years in every important dimension, including Product quality, price, delivery, dependability, flexibility, service, and the capability to rapidly introduce new products."

This research supports my own observations of results in many industries—we have struggled hard to update and modernize our industrial management techniques, but the results are still very disappointing. The inescapable question this raises is whether there has been something wrong or insufficient in what has been called the "U.S. industrial renaissance."

One conclusion seems clear: we are now in a totally new industrial era in which the performance required for competitive success is orders of magnitude greater than in the past. But

in the face of these heightened requirements, hard-pressed production managers appear to be trying for competitive parity principally by concentrating on adopting the latest tactical controls and planning techniques.

This traditional approach of industrial managers is the football equivalent of "blocking and tackling." We all know that being good at blocking and tackling, i.e., "the fundamentals," is necessary and all to the good. "Three yards and a cloud of dust" was how sports writers used to describe Ohio State's fundamental approach to winning football games. But in today's competition, three yards and a cloud of dust no longer wins. Fundamentals are not enough. They don't win in football, and in industry they are resulting in "competitive gridlock."

It is strange that in spite of the new excellence demanded by more intense and global competition, it seems to be business as usual for this profession. What is "business as usual?" For over one hundred years, the predominating pattern of industrial management has been a parade of ever-new planning, scheduling, and control mechanisms. These are the "fundamentals" for industrial managers.

Indeed, the characteristic response of industrial management professionals to new or difficult problems has typically been to install some new management technique. This approach to production problems—which is essentially strictly tactical—was initiated by the first production controllers and schedulers around 1850 and later elaborated by Frederick Taylor.

Today, a mind-set that limits firms to operational tactics permits the achievement of competitive superiority for only a short time, if at all. It is a "three yards and a cloud of dust" philosophy, which demands a healthy excellence in fundamentals, but its fatal flaw in today's environment is that it ignores the dimension of strategy. More explicitly, it totally misses out on the potential of a manufacturing strategy for creating distinct competitive advantage.

It hardly seems old-fashioned or stubborn to be employing the latest techniques but ironically, this is as limited in a strategic sense as "three yards and a cloud of dust." For although AMTS may often be essential in avoiding competitive disadvantage, that is about as far as they go. The result of today's quick-reacting competition is that AMTS no longer create anything more than a short-lived advantage, leaving the industrial manager competing with nothing better than a predictable smash into the line on the often unlevel and constantly-changing playing field of global competition.

But since typical industrial managers do not seem to know what to do differently, today's dilemma is the product of current as well as century-old history. To arrest the recent twenty-year free fall in market shares of global manufacturing in the West required most industrial firms to readdress how their factories were being managed. The urgent need to improve performance provided just the stimulus needed for top management to see to it that their manufacturing functions were revitalized. The technocratic response of industrial managers to this strategic challenge might have been expected: history repeated itself.

For when top management turned up the heat in the mid-1980s, what emerged was a scramble to quickly adopt new or reborn management techniques, the bulk imported from Japan. In the continuing struggle for their firms' survival, industrial managers have chosen once again to limit their weapons to common management techniques, and thus to play the game without the unique competitive advantage that could be contributed by their own manufacturing.

Unfortunately, their punishment fits their crime. For by allowing their organizations to compete in global manufacturing with limited, tactical management tools, they are condemned to a perpetual struggle. Competing on the knife edge with little chance of pulling ahead, always feeling the need for one more new production management technique to stay in the game, industrial managers have unknowingly chosen to endlessly run on treadmills of their own design.

I do not slight the positive result of this scramble: a decade of frenetic activity in installing techniques which has probably brought about more positive changes in factory management than in any other decade in industrial history. And because industrial managers have learned and are applying a new (for them) set of powerful management concepts and techniques with some

success, perhaps blocking and tackling better than ever before, their self-esteem appears to be much better than it was a decade ago. In fact, except at the higher levels, my observation is that most production managers and especially functional ones (such as production control or quality control managers) are proud and pleased with their recent accomplishments.

So after about ten years of floundering in the 1970s, revitalized management efforts concentrated upon the diligent application of such exciting management tools as total quality management (TQM), just-in-time (JIT), lean and agile manufacturing, and computer integrated manufacturing (CIM) and about twenty other well-known and increasingly popular advanced manufacturing techniques (Exhibit I).

Certainly these AMTS have improved results enough to keep many companies from continuing to slip competitively. There is no question but that American industry has improved its quality and costs substantially, and many industries have slowed down or even stopped their twenty- to thirty-year decline in competitiveness.

But there is an obvious problem with this mode of improvement: because these AMTS are available to all competitors, they cannot and do not create robust competitive advantages. They may improve results and reduce competitive disadvantages and thereby keep the renewed firm from going under, but this is not an approach to becoming an industry leader. Playing the game by adopting other firms' proven techniques condemns even the expert player to a never-ending struggle just to stay average.

Due to the mind-sets of their managers, many companies are paying the price of continuing competitive gridlock. Although new techniques have slowed the competitive slide for many and their manufacturing fundamentals are now more neutral and no longer dragging them down, too few derive competitive advantage from manufacturing.

The critical question for top managers facing ever-rising standards of global competition is whether simply getting better productivity and quality and inventory turnover is enough. Can the wholesale adoption of AMTS such as JIT, TQM, and CIM, now well underway, provide a competitive edge to U.S. industry in steadily growing cutthroat worldwide competition? Is "three yards and a cloud of dust enough?"

The evidence suggests that the answer is "no." Employing "continuous improvement," "benchmarking," JIT, TQM, and seeking to become "world class manufacturers" have only led, at best, to competitive stalemate for those respondents of the Manufacturing Roundtable.

Yet, in spite of these results, techniques new to the manager and sold by enthusiastic consultants just cannot be resisted, while basic, structural manufacturing policies are not even brought up for discussion. AMTS are somehow part of the landscape, the accustomed air always breathed and seldom challenged.

Do fancy new techniques do more harm than good? Not usually. It's better to put in the new tricks when everyone else is, generally speaking, for by and large the new tech-

EXHIBIT I

Concepts and Techniques in Manufacturing Management

ABC: Activity-Based Accounting
Agile Manufacturing
Benchmarking
CAD: Computer-Aided Design
CAM: Computer-Aided Manufacturing
Cellular Manufacturing
CIM: Computer Integrated Manufacturing
Concurrent Engineering
Design for Manufacturability

Doctrine of Continuous Improvement
Empowerment
Flexible Manufacturing
FMS: Flexible Machining System
Group Technology
JIT: Just-in-Time inventory management and. flow management
' Lean Manufacturing
Management of Technological Innovation
Manufacturing Strategy
MIS: Management Information Systems
New Product Development Management
Product Realization Management
Quality Circles
Queuing Theory
Re-engineering
Simulation
SPC: Statistical Process Control
Supply Chain/Value-Added Management
TBM: Time-Based Management
Teaming
Technological Forecasting
TQM: Total Quality Management
Value Analysis
Work Sampling
World Class Manufacturing
Zero Defects Program

niques are sensible, innovative, and alleviate problems, resulting in better performance. If you don't use TQM or something like it to improve your quality, you don't stay in the competition.

So the new techniques are patched on with great enthusiasm as managers enter an exciting new world. Successfully installed, manufacturing may no longer be a drag on the business. But while this beats "dying on the vine," it is not the way to create a distinctive core competence.

Let me be clear that like the techniques of the past, these currently popular techniques are generally sound where properly understood and applied. While some companies do a much better job than others of installing and using these techniques, the problem is not with the techniques themselves. For example, JIT and MRP2 are marvelous creations, but they are very different and need to) be chosen for relevancy to the process and to other elements of a coherent infrastructure.

TQM is old, basic, and generally useful if not carried to a high cost extreme. "Lean," "agile," and "reengineering" are more basic, and can lead to more fundamental, whole-cloth rethinking rather than patching new techniques onto wornout structures. But even they are devices for maintaining minimums of competitive performance. AMTS are so common these days they come close to being not much more than good housekeeping. Even so, they usually pay off if buying too many at once does not cause indigestion and the ones installed are not mutually inconsistent, not an unusual occurrence.

It is seldom realized that many techniques are in conflict with each other and collide head-on on the factory floor. Further, patching on new management techniques to fix non-competitive, poorly-performing systems has an opportunity cost. If lots of these techniques are attempted, serious falldowns occur as management is overloaded and cannot stay on top of each application.

Worse still, an AMT obsession typically leads the firm to forego the alternative of shaping and forging the manufacturing system as a competitive weapon by establishing coherent manufacturing policies to serve the strategic task of the business unit.

Let me illustrate, with two case examples from 1994, how seductive yet disastrous it can be to inadvertently back into an implicit, incorrect set of manufacturing policies by carelessly adopting AMTS that are non-coherent and unfocused.

Company A

With sales of about \$ 1 B, the firm produces giant electrical machinery, products which cost \$ 100 M apiece and take three years to make and for which on-time promised delivery had always been crucial for success. After losing significant market share to foreign competitors, Company A re-energized its manufacturing management, installing JIT and TQM, went heavily into "teaming," initiating literally 551 continuous improvement projects, and, using empowerment concepts, developed better union and worker relations.

While market share losses slowed somewhat, the entire industry became more price sensitive and new contracts had to be bid with much lower margins. Suddenly, the firm began to recognize substantial overruns in labor costs relative to bid levels and by the time this was realized, many millions of dollars had been lost. Subsequent analysis revealed that the structure of the industry had changed and, consequently, made it necessary for Company A to change its competitive strategy.

While the management realized the necessity of changing its competitive approach, it failed to recognize that the critical task of manufacturing had shifted from on-time delivery to low cost. No changes were made to the infrastructure of control systems, so, for example, it had addressed neither the cost collection and analysis system that collected costs by functional department, nor the management performance and reward system, which was based on meeting schedule mileposts rather than man-hours. Both of these fundamental, structural systems had become inappropriate to the competitive strategy of the firm.

Instead of developing coherent manufacturing policies to support the firm's strategy, the focus on techniques had led to disaster. None of the newly-adopted advanced management techniques addressed key structural issues, and the company simply could not compete. These management failures came about because the company had no annual or otherwise regular management processes by which all manufacturing policies were reviewed for consistency and response to changing competitive conditions. In this sense, perhaps the outcome was inevitable.

Company B

This company produces electronic assemblies for its parent and on a contractual basis for other companies. Recognizing the intensifying cost/price focus in the industry, the company introduced highly automated, labor-saving equipment, JIT, and TQM (both with extensive use of experienced consultants) into a newly built, large, specialized, high-volume plant to achieve economies of scale. Time-based management was also installed using a third consulting firm.

Supervision was relaxed and informal and the plant was set up in a semi-rural area to avoid union organization of labor. The installation was clean, and working conditions immaculate and attractive.

In spite of all these modern and well-proven techniques, the operation nearly failed for one reason: the equipment and process technology was so highly automated and special purpose that it could not handle the mass of small, custom orders that predominated the work available, due to the trends in the industry toward shorter product lives, more customized products, lower order quantities, and intense competition.

The techniques learned from the Japanese and other competitors made Company B appear competitive, were impressive to visitors, and gave their managers a good deal of satisfaction for being "modern and energetic," but failed to provide a competitive advantage. Meanwhile, their failure to design the manufacturing processes to be appropriate to the industry and their own strategy made the plant an economic failure, heavily capital-intensive but with a low volume of business.

To this writer, these examples of misfits between strategy and structure are very common. Indeed, I find them in 95% of my plant visits. The exceptions, such as the Morine Company, are dishearteningly rare (see the accompanying article by Larry Bennis). The prevalence of these situations seems to reveal an almost irrational, kamikaze-driven mindset, a mindset that appears quite unrecognized by its possessors.

In one decade, the standards for competing in global markets have risen to levels never seen before. Standards of quality, cost, productivity, delivery cycles, and the speed of new product development are all now more demanding than ever. These levels have been raised by competition worldwide, made possible by applying old techniques like TQM, "benchmarking," and the "doctrine of continuous improvement," and new tools such as the computer and automated processes and servo controls.

Now everybody can and generally does share these techniques. And without a good modicum of these techniques, especially TQM, which is pretty basic, the firm is just not in the competition.

These are minimums, the ante-ups that manufacturers must put on the table to play in the game. No one should try to run a factory without a good dose of them. They are "blocking and tackling," techniques to fix sub-standard factories, to try to regain ground lost to competitors who invested in them earlier. But the ability of AMTS to create competitive advantage is open to question. How could they do so when everyone else is doing it and many have begun years ahead of the late competitor?

These issues go to the heart of the industrial management dilemma. In the last ten years, the profession as a whole has reacted as they have always reacted. Meanwhile, the results suggest that much of U.S. industry is not on the right track. It seems clear that more of what we are already doing is not the answer.

We have to ask why the AMT solution is apparently so universally and happily popular. This question brings us face-to-face with the disturbing fact that industrial managers typically do not seem to realize that their present attack is inadequate. Until they and their CEOs understand this, I am afraid that we are in for continued competitive gridlock.

It is beyond the scope of this paper to estimate the impact of national manufacturing competence on our global market share of manufactured products, imports, exports, and the number of better-paying jobs in manufacturing. Let it suffice to say that such competence is extremely important to the U.S. economy.

So after this orgy of long overdue change and its ensuing benefits and costs led by industrial management professionals, an issue now facing CEOs is whether they will allow those managers to continue to limit their firms' performance by adhering to the traditional, technique-centered approaches of the past. When the coach sticks to fundamentals and the team is great at blocking and tackling but seldom wins a game, what is to be done?

There are alternatives to tradition. My opinion is that many industrial managers need to learn about them. In fact, there are many alternatives to the present practice of tinkering with the system using AMTS. They start essentially with changing the manufacturing system rather than just trying to fix it.

Instead of applying new control and planning systems (AMTs) to existing physical and policy structures, an entirely different approach is to redesign the basic manufacturing structure itself. What companies seem to need in this new world of intense global competition are not more techniques, but a way to structure a whole product realization system differently and better than

any competitor. This is what the "manufacturing in the corporate strategy" concept (MCS) is all about: designing a coherent, internally consistent system focused on a strategic business task.

To do a strategic redesign of a manufacturing system, industrial managers have six areas of system design, essentially the levers of the designer, in which they can range about and make choices in order to create strategic advantage. The redesign can be "strategic" if the six areas are designed with coherence to achieve focused performance of the productive unit which is far superior to that of any competitor and extremely difficult to copy.

Those six areas of system design are: (1) what is made versus what is bought (the vertical integration decision), (2) the level of productive capacity (in total and at various stages of production), (3) choices of equipment and process technologies, (4) the number, size, and location of facilities, (5) human resource management policies and practices, and (6) management techniques for planning, measuring, controlling, and coordinating the various functions involved in the value chain of product realization. Only the sixth area includes AMTS.

It is too common these days to place scant attention on the first five of these alternatives and rely excessively on the sixth. This is the "three yards and a cloud of dust" approach. Unique, competitive advantage that is difficult to copy or match results from a coherent and focused set of decisions in all six areas, and not the sixth alone.

We are left with an important set of questions not yet answered. It has to do with the profession of industrial management and the orientation of its top-level managers carried over from the past and continuing today. The problem now is that their tradition of seizing upon AMTS as a way to compete is outdated by today's new industrial competition. Just "competing" when there are so many excellent competitors generally results in very small market shares. Further, case analyses of noncompetitive situations such as those at Companies A and B demonstrate the clear need for an explicit, coherent manufacturing policy. It is surprising, therefore, that MCS is so infrequently encountered.

As my preceding paper in this issue concludes, the problem lies both with the theory, which is not thoroughly complete, and with the practitioners themselves. As the first article concentrated on the theory, we focus now on the practitioners.

The MCS process is generally very successful when used properly. But because it is not readily absorbed or mastered and often seems to be even mystifying or repellent, the premises, skills, practices, and mindsets of industrial managers certainly appear to be significant elements in the problems of competitive gridlock. We close on this topic: the state of industrial management in 1995.

Industrial Management in 1995

The industrial management profession is now one-hundred years old and the productivity and efficiency-centered mindset of typical industrial managers is of the same vintage. It has hardly changed in a century. Since 1860, industrial managers have relentlessly focused on productivity and efficiency, constantly seeking to lower costs with a steady flow of new management control and planning techniques.

As might be expected, this single-minded, consistent concentration on productivity has produced spectacular results along that particular dimension. Output per worker in the United States has moved up in every decade, leading the world in most industries, and today is better than ever. The profession has been energetic, problem-centered, and imaginative.

But this all-consuming focus on productivity and management techniques has consistently drawn managers' attention inward to operations, and away from an outward, strategic, and business orientation. Looking inward, the interests of industrial management professionals tend to concentrate on daily factory operations: schedules, costs, and acceptable quality.

That inward preoccupation explains just why industrial experts have had such splendid results in continuous improvement and increasing efficiency while more recently losing out in competition and thereby failing their stakeholders. There is indeed a "productivity paradox" (Skinner 1986).

Certainly, some readers are now thinking: "What can possibly be wrong about focusing on continuous improvement? Shouldn't all industrial managers and engineers always be trying to improve factory operations?" Strangely, the answer is "no."

The answer is "no" because an obsession with operations has frequently spoiled the very results industrial managers were trying to achieve. The more that "productivity" is the main driver to be rewarded, the more elusive it becomes and the more it drives out innovation. Worse yet, this inward focus typically leads to misguided or neglected decisions in areas conceptually outside of the scope of internal operations.

When this happens, the firm typically gets saddled with the wrong plants and/or the wrong processes and/or the wrong infrastructure of systems and policies, any of which take years to correct and meanwhile, spell disaster at the worst, and slow, tortured struggle at best. Witness Companies A and B. These results have made it increasingly clear that the highest productivity no longer always wins the order, and that the plant with the best set of management controls and planning techniques is not necessarily the most competitive.

These facts of recent history make it surprising to observe that productivity and AMTS still absorb the minds of most industrial managers today. The march goes on like lemmings into the sea—in the 1970s, the techniques were time and motion methods, work standards, work simplification, short interval scheduling, process control charts, PERT. In the 1980s, it was MRP, TQM, JIT. The popular off-the-shelf techniques in the 1990s have been TBM, MRP2, CIM, and "lean," "flexible," and "agile."

Granting that industrial managers discovered in the 1970s that they had fallen behind in operational techniques and needed to learn new ones from competitors, especially the Japanese, and therefore had to focus in that direction, it still seems surprising that managers appear to expect that AMTS will create competitive advantage.

History is repeating itself: one-hundred years of minds set on tools and techniques, while the enterprise ultimately suffers in competition. The tendency to persist in the old tradition, clinging to a century-old premise of what defines good performance even after twenty-five years of painful results, suggests that the new rules of competition are not yet broadly understood.

With notable exceptions, the profession of industrial management demonstrates a century of such passion for "means" that "ends" are taken for granted. Unaware, managers seem to act as if their fundamental reason for being is to run highly productive operations. And in order to meet this end, they perpetually develop and install fascinating and clever management techniques and controls. These are in fact "means" but they are treated as "ends."

The strategic objective of industrial operations should never be efficiency. Some of the most efficient plants in the world have failed to compete. It is equally a mistake to believe that gradual improvements in operational efficiencies will be sufficient to keep a company in business. The currently popular technique of "benchmarking," by which a firm attempts to do as well as the best "world-class" competitors, is a recipe for competitive grayness.

In a competitive world, the essential, ultimate goal must be to become a superior v competitor. This is not exactly a subtle distinction. It is entirely different from managing for productivity or quality or efficiency or benchmarking.

The reason to invest in a factory is not to have an efficient production facility or even a "world-class" plant. It is to create competitive advantage. If the factory does not create competitive advantage, the capital should be used elsewhere and the product purchased rather than made. Yet too few industrial managers have come to recognize that they can create powerful competitive advantages by differentiating their manufacturing policies from those of their competitors.

This is the message of the unconventional approach to manufacturing management called "manufacturing strategy." But the long tradition of applying currently "advanced" manufacturing techniques seems simply too overpowering a mindset to overcome in one generation of managers.

Presently, the conventional practice, which leads to noncongruent, unfocused policies, is that various elements of manufacturing structures just get modified one by one as they are each handled by the particular professional functional expert most concerned (Skinner 1971) . But what are needed and very rare are managers who are competent in the many functional sectors of manufacturing, especially now that "manufacturing" must encompass far more than what is inside the walls of a factory. MCS demands broad competence in all of the production functional specialties and the firm's strategic situation if the manufacturing structure is to be redesigned to meet corporate strategy.

In 1969, as the nation was beginning to slip in manufacturing, I wrote that "manufacturing is managed wrong" (Skinner 1969). Now, 25 years later, it is still managed much the same way and that way is as wrong as ever. The problem is one of leadership and it is the premises, cloned training, and mind-sets of the industrial management profession that are the root of the problem.

Bred and nurtured in one special function or another—such as production control, quality control, foremanship, engineering, personnel, or inventory management—we have too many specialists and too few men or women who can design a coherent set of manufacturing policies and keep them coherent in dynamic, changing competition, technology, and economics.

In one century, industrial managers have had one goal and, of course, one result. A different goal, not of productivity but of winning by outstanding manufacturing, clearly demands different leadership. To bring to manufacturing a system-wide, strategic point of view requires more top-level managers who are general managers rather than functional managers.

This is the state of industrial management at century end, and a "business" point of view is what is missing in industrial management. So the opportunities for a new breed (skinner 1985) of differently trained men and women and their companies are substantial. By the same token and without undue optimism, we can probably expect that these new leaders will emerge in a Darwinian process from diverse backgrounds and educations, and that many of them will come from outside of "manufacturing" per se. They will bring to top management the talents and focus of a business rather than a merely technical or functional perspective. They will take charge and lead because of their capability for envisioning and regularly redesigning the production and operations function as a key to innovating a winning corporate strategy. The answer to "competitive gridlock" is a new breed of managers whose focus is no longer on advanced manufacturing techniques, but on achieving competitive superiority.

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