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Successful Japanese Management Practices--Lessons for U.S. Students?

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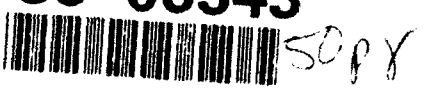

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SUCCESSFUL JAPANESE MANAGEMENT PRACTICES-- LESSONS FOR U. S. STUDENTS?

by Col Doug Blazer

ABSTRACT

America's rate of productivity growth has lagged Japan's and other western nations over the last twenty years. Some critics claim America's business schools are part of the reason for the lagging productivity. The paper surveys 12 American production and operations management texts to see if they include lessons already learned by Japanese production managers. Production areas surveyed include: productivity, business strategy, Japanese production process techniques, and human resources. This paper concludes, that until very recently, American texts do not include the right lessons. The paper identifies gaps in the operations management curricula in research and development and human resources areas.

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PART I, THE PROBLEM

Productivity is the stuff of which a nation's wealth is made. In the long run, there is nothing more important to the prosperity of the United States than productivity. Without steadily increasing productivity, the nation's standard of living will stagnant, its economic strength will wither, and its national security will weaken. As Kennedy shows in his book, The Rise and Fall of the Great Powers, throughout history the relative economic growth of nations predetermines shifts of national power (28). Take Japan and England for example. Since World War II, England's productivity growth has averaged 1.5 percent per year, while Japan's has averaged 7 percent. As a result England has become a third-rank power; Japan is fast becoming a first-rank power (30:11).

The U. S. has trailed virtually all other industrialized nations in productivity growth for the last 20 years. America's annual rate of growth is a little more than 1 percent per year, which has brought the rate of improvement in the nation's standard of living to a virtual standstill (.004 percent average annual increase from 1973 to 1988) (30:11).

Besides the possible erosion in America's standard of living and quality of life, productivity is fundamentally important to national security. Twenty-one percent of U. S. manufacturing is dedicated to defense and fully one-third of all high technology industry goes to defense (13:41). If productivity declines and

makes these defense goods more expensive, or worse yet, makes America's defense industries noncompetitive globally thereby forcing them to close down, then our national security will become heavily dependent on foreign technology and manufacturing. That is an untenable situation (13:41).

The data shows America's annual rate of growth in productivity is declining and economists have attributed the decline to a myriad of causes. Others claim there is no problem--that only America's brief recent history has the rate of the productivity increase been so low (3,45). In the long run, there has been no decline in the absolute levels of productivity. To be fair, these economists have a point. The U. S. is still by far the largest world's economy in terms of total production, wealth and productivity. In terms of real Gross Domestic Product (GDP) per worker, the leading industrial nations average only about 75 percent of the U. S. level (3:357).

Notwithstanding the fact that the U. S. is still the world's most productive nation, the rate of improvement has stilled slowed to a crawl. More importantly, America seems to be losing its competitiveness--its ability to sell its products worldwide.

America has lost much of its industrial leadership position to Japan over the last 40 years. The once booming, seemingly untouchable U. S. industries--steel, machine tools, automobiles, and electronics--have virtually fallen to the wayside by Japan's unprecedented industrial growth. Since 1950, Japan's productivity has far surpassed America's. In industry after industry, the U. S.

has lost its leadership of the world's market share to Japan.

Is America losing its competitive edge? Why is Japan so successful? Is there anything we can learn from the Japanese?

Many claim America is losing its competitive edge. Why? Some (30,17) claim macroeconomic factors, especially low investment (and savings) levels. They claim increasing the rate of capital formation will solve the problem.

Others (10,53) say capital formation and macroeconomic factors are only part of the problem. Although there is no consensus, their studies show low investment accounts for at most 40 percent of the productivity decline. Other factors--pollution and regulation, energy prices, research and development expenditures, and the composition of the work force--account for some portion of the productivity slowdown. But all conclude there are other factors.

The Massachusetts Institute of Technology (MIT) Commission on Industrial Productivity concluded that a purely macroeconomic approach was insufficient to explain America's industrial performance. They claim "organizational and attitudinal" deficiencies play a role (13:38).

The MIT Commission and others (42,1,13:38) think the U. S. should focus on the production process as a way to stimulate productivity growth. They indicate macroeconomic factors tell only part of the story and it's a mistake not to study weaknesses and make improvements in U. S. production management practices.

They especially recommend a study of Japanese production

practices. In the automobile industry for example, Japan produces cars in fewer years (3.5 versus 5 years from concept to market phase), with fewer defects (only one-fourth as many as American cars), and at 70 percent the labor cost (13:37,1:80,15:97). Some claim it's not the Japanese production management practices, but rather its culture or macroeconomic factors (high savings and investment rates). Yet in cases where Japanese took over American plants--like Toyota in Kentucky, Kawasaki in Nebraska, or Sony in California (42:202)--they achieved productivity improvements similar to those accomplished in plants in Japan.

So production management is a factor in America's productivity decline. But why haven't our production managers kept pace with the Japanese? Many (13,15,42) have indicated our business schools have not kept pace and are teaching the wrong things. The MIT Commission concluded that business schools have incorrectly made production and operations management less central to the curricula (13:162). Drucker (15:102) agrees that business and engineering schools are not teaching "a discipline that integrates engineering, management of people and business economics into the manufacturing process"--things the Japanese have already learned and are doing well. Schonberger in his 1982 book, Japanese Manufacturing Technology, also criticized America's business colleges for not teaching successful Japanese production management practices.

PROBLEM STATEMENT

In this paper, I seek to answer whether America's business school's are teaching the right lessons to increase America's productivity and competitiveness. Or at least whether America's production management texts include the lessons already learned by Japanese production managers.

METHODOLOGY

Since there is not sufficient time to survey the hundreds of American universities and business schools to determine exactly what is being taught, I instead survey production and operations management text books. Do the text books used by America's business schools include the material needed to make America's manufacturing process more productive? In particular, do the texts describe the production practices used so successfully by the Japanese?

The criticisms of America's production process fall into four areas:

* Productivity
  - Does the text address the U. S. productivity decline and the role production management practices play in that decline?
* Business Strategy
  - Is production a central focus of the firm's strategy?
* Japanese Production Process Techniques
  - Are successful Japanese production practices included in the text?

* Human Resources

- Does the text include the Japanese concepts of team building, cooperation, and flexibility?

OVERVIEW

In part II of this paper, I discuss the four areas--Productivity, Business Strategy, Japanese Production Process Techniques, and Human Resources--and explain how they can increase America's productivity. Through this discussion, I develop a list of topics that the literature suggests should be included in any text book attempting to teach American students how to improve America's productivity. In part III then I survey 12 American text books to determine if they include the necessary educational material to improve U. S. productivity. Part IV provides a summary.

PART II, PRODUCTIVITY PRODUCING MANAGEMENT AREAS

In this part, I review the literature to identify topic areas that have been widely cited as reasons for Japanese productivity successes or areas of criticism for the lack of a higher U. S. productivity growth rate. I discuss the productivity enhancing measures in this part and in Appendix A develop a list of questions to determine if production management text books include these productivity enhancers.

PRODUCTIVITY

America's productivity rate has been declining since World War II, with the period since 1970 being the lowest at 1.2 percent (3:361). So clearly the lack of productivity growth was well-known and production text writers could have included it. Although many references in the 70s cite macroeconomic causes of the productivity decline, there are many references that cite production management practices as contributing factors. Examples include: Abernathy in 1978 showed poor production management practices in the automobile industry resulted in the loss of productivity and market share, Hinrichs in 1978 cited business practices in case studies of several industries lead to decreased productivity, and Gold compared Japanese and United States productivity in the steel industry (1:40,22,19).

So the fact there is a productivity decline in the U. S. should be included in production texts. The survey then seeks to determine if the texts:

1. Include a discussion of the U. S. productivity decline
2. Cite production management as one of the contributing factors of the decline.

BUSINESS STRATEGY

The literature highlights one of the main reasons the U. S.

businesses reduced productivity growth was the failure to make production management a focus of business (13:132). Several sources (13:132,42:215) point out engineering and production were the focus of management and business strategies in the 40s when production and quality were paramount in producing war-time supplies. But in the 50s the focus was on marketing to sell the surpluses produced in the 40s. The era of accountants, lawyers,and financial managers took over in the 60s and 70s as mergers and acquisitions were at the forefront of business and business schools (42:215). Thus for the last 35 years corporations were run by staff specialists, with production management taking a secondary role (15:96,13:132). The literature highlights four areas of business strategy that particularly hurt U. S. productivity.

Integrated Strategy with a Production Focus-Several authors suggest production must be an integral and focused part of business strategy. Businesses must develop a "market and product and process design strategy featuring fast growth of market share by producing a low price and high quality product" (42:217). The strategy must include a "quick production response to produce and compressed lead times." In a 1982 survey of 236 top level executives from 195 U. S. companies, the single most important reason given for America's declining productivity was management's ineffectiveness in addressing multi-discipline problems (24:96). The literature (15:96,13:133,42:217) strongly recommends an integrated systems view of strategy with engineers, production and

marketing managers jointly developing a product and process strategy.

Short-term Bias-The second most important reason for America's declining productivity according to the 1982 survey of 195 U. S. companies was management's excessive concern with short-term results (24:96). Studies show most U. S. companies have a reward system that favors quick pay-offs and "against the patient exploration of long-term investments" (13:144,16:131). Thus many long-term investments that will increase productivity and be profitable in the long run are sacrificed for short-term gain. Economists point out low investment levels is one of the primary reasons for the productivity decline and favor macroeconomic policies that foster investment (30,33). Macroeconomic policies (lowering the cost of capital) will help, but the mind set that fosters shortsightedness must also be addressed (16:131).

Performance Measures-Part of the reason for the short-term bias and lack of production focus in business strategy is the financial bent of performance measures. Financial measures like quarterly earnings and earnings per share reflect short-term thinking. There needs to be a balance between short-term and long-term measures (16:131). Businesses need to add nonfinancial and production measures like market share, productivity, defect rates, response time, quality, customer satisfaction, and employee attitudes. And these measures must help determine business strategy, promotions and bonuses (16:131). Employees pay attention

to the performance measures the boss looks at. So if production performance is to improve, it must be measured.

Research and Development (R&D)-The final area under business strategy, but by no means the least, is research and development. Economists point out the importance of R&D to productivity (33). So any study of productivity should include R&D strategy, and therefore should be included in production texts. The U. S. has been a world leader in investment in R&D, however the U. S. devotes two-thirds of its R&D investment in new and improved products and one-third in process technology. While Japan's R&D investment is just the reverse (33:72). Mansfield points out that despite criticism of the U. S. predominant investment in products, there has been no change in its R&D investment pattern (33:72). And when the U. S. does invest in new process technology, it takes the less costly, lower risk (short-term bias) proven technology. Thus, the U. S. has more "product breakthrough" innovations than Japan, but produces lower quality, lower reliability goods with less efficient processes (13:72,33:73).

Besides the focus of R&D in the U. S. on product technologies, there is also a lack of teamwork in the product development process. The traditional practice for U. S. companies is for the engineers to design the product and "throw it over the wall" to the manufacturing department (13:69). As a result, there is less focus on manufacturability and quality of the process. The Japanese use a multi-disciplined team of engineers, marketers, and production managers to design the product and the process. The team remains

together during the production process to continuously improve both the product and process over the life of the product (42:181,49:115,41:59).

JAPANESE PRODUCTION PROCESS TECHNIQUES

The Japanese have focused on the production process of their industries and there is much the U. S. can learn from their practices. Japanese industries have produced lower cost, higher quality products, and as a result have dominated many once strong U. S. markets. In a 1977 Hertz Company study of the number of repairs per vehicle for the first 12,000 miles of operation, Toyota had only one-eighth the repairs of American cars (52:737). And the Japanese accomplished this with less investment. Japanese inventory turn-over ratios exceed the United States in 13 out of 15 industries studied (52:738).

How do they do it? They do it by focusing on production using a system called Just-in-Time production. This system requires producing precisely the right units in the right quantities at the right time (52:743). The factory produces exactly what is needed to assemble the final product. With Just-in-Time, the ideal lot size is one. The process flows from the raw materials through each work station until it is a finished product. Thus the plant is set-up in a process flow, not functionally like many U. S. factories. Each work station receives the unfinished (work in-process) product and all the necessary parts for that work station

at the same time. The worker at that station completes his process (usually requiring several different functions) and passes it to the next station.

Just-in-Time production minimizes inventory investment, because workers produce only enough for the finished product. In U. S. companies, functional work stations produce lot sizes "just-in-case" something goes wrong (i. e. a schedule change). U. S. firms require larger lot sizes, in part because set-up times (the time to retool to make the next product) are so long. American businesses use optimal economic order quantities which determine lot sizes based on set-up times. Japanese firms reduce set-up times to optimize (minimize) lot sizes.

The Japanese also view quality differently than their U. S. counterparts. In the U. S. quality is controlled by inspectors at various points along the process. So the process could be producing defective parts that won't be discovered until it gets to the next quality control point. In Japan, the workers themselves are responsible for quality and check for defects at every step in the process. The Japanese concept is called Jikoda--"stop everything when something goes wrong". Any Japanese worker can stop the entire process and a team resolves the problem immediately before any more defective parts are produced.

Just-in-Time means all parts are provided at the right time. This includes supplier provided parts. The Japanese foster an enormous, close-knit subcontractor network. They develop this network based on long-term partnerships and trust. The

relationship is necessary to Just-in-Time because the entire process depends on delivery of the subcomponents at the right time--usually many times a day.

Just-in-Time increases productivity by minimizing inventory investment, shortening production lead times, improving quality, and being able to react faster to demand changes (52:744). The Just-in-Time system includes many sub-concepts that could improve U. S. productivity performance. I highlight four of the successful process techniques--stockless production, Total Quality Management, vertical integration, and manufacturing flexibility--to include in the survey of American text books.

Stockless Production-Stockless production (the Japanese call it Kanban) entails committing to achieving zero lead times and zero inventory. This means "keeping materials flowing steadily through a fully integrated production process" (35:84). Stockless production includes reducing set-up times and a process of continuous improvement. As the Kawasaki experience showed, it takes up to five years to achieve the ultimate improvements in inventory, lead time and productivity (35:87).

Total Quality Management-Besides the concept of Jikoda and continuous improvement, text books should also discuss competitive benchmarking and customer service audits. That means quality beyond the plant itself (47:139). A 1981 survey of 1300 U. S. companies showed 60 percent of chief executive officers said the quality of their products was improving, while 50 percent of their customers thought quality was declining (47:139). Clearly U. S.

companies need better measures of quality and improved quality programs.

Vertical Integration-For a Just-in-Time system to work, manufacturing must have dependable suppliers. And the Japanese are masters at developing a network of sub-contractors. Toyota, for example, purchases 80 percent of the value of sales from suppliers, while Ford and General Motors purchases less than 50 percent (1:73,8:94). Much of the Japanese vertical integration is accomplished without much investment in its subcontractors physical plant. This allows the Japanese the advantages of vertical integration--reduced transaction costs, assured suppliers, improved integration and coordination in production, inventory, and technology--without the disadvantages--heavy capital investment and reduced flexibility (8:94).

Although Japan's system of networking is ingrained in the Japanese infra-structure and culture, which the U. S. could not replicate, nevertheless there are lessons U. S. firms can learn and copy. For example, U. S. companies can develop long-term contracts and relationships with suppliers (1:74). Indeed, U. S. firms traditionally have formed adversarial relationships with their suppliers, providing few incentives to suppliers to share in product or process innovations (13:100).

Manufacturing Flexibility-The final successful Japanese production technique, manufacturing flexibility, has also contributed to Japanese productivity gains. The Japanese emphasize design for manufacturability (1:76) and the integration of design

and production leads to greater flexibility. The Japanese worker is also more flexible; they design jobs with more breadth (more skill per job) (1:76). Therefore the Japanese more easily adapt to change. Finally by significantly reducing set-up times, the Japanese are able to adjust their manufacturing process in as little as one-tenth the time as U. S. counterparts (52:749).

Summary-The Japanese Just-in-Time system has worked for Japan and is working in some U. S. and European companies. A study of 80 plants in Europe showed the following benefits for Just-in-Time:

1. A 50 percent reduction in average inventory
2. A 50 to 70 percent reduction in throughput time
3. Productivity increases between 20 and 50 percent.

Clearly, Just-in-Time systems concepts should be included in American textbooks.

HUMAN RESOURCES

The Japanese management of human resources is a function of its culture and is quite distinct from Western practices. In Japan, most employees are hired for life. College graduates usually choose a firm based on where they wish to live, not the company or the job. In fact, Japanese firms do not hire for a specific job--they want an adaptable individual. Recruitment emphasizes personality and character, rather than vocational or educational qualifications (41:32).

Once hired, the employee usually rotates from job to job

receiving considerable on-the-job training. Major training programs are internal to the company. The average Japanese manager of a large firm works in 6 different functional areas by the time he is 40. At any point in time, more than half of the top executives and nearly two-thirds of managers and specialists are enrolled in an education program of some kind (41:41). Training is a constant throughout the career of a Japanese manager. The job rotation and training is meant to produce general managers rather than functional specialist. The aim is to develop well-rounded managers for executive positions. Nearly 60 percent of the executives of 300 large Japanese companies stay for life in the same firm (41:47).

Japanese wage and salary are based almost exclusively on seniority. Promotion is based on seniority and merit. Japanese firms all promote from within. College graduates enter a company as a class. Members of that class are promoted into mid- and upper-management positions based on merit. Eventually one or two members of that class become a member of the board of directors and hold that position for three to five years (41:53,38:175).

A Japanese decision-making process, the Ringi system, is based on consensus management. Ringi means "obtaining approval of a proposed matter through vertical, and sometimes horizontal, circulation of documents to the concerned members of the organization" (41:57). Usually a middle-level manager prepares the document and circulates it through the company. When all the appropriate departments agree with the document by signing it, it

becomes policy (41:57). Thus it is middle management who takes the initiative to make proposals and decisions, senior management creates the environment to foster cooperation (41:58). Under the Ringi system, many people including lower management participate in the decision making--group leadership and group decision-making is the norm (41:58).

Although some of the literature claims the Japanese success in human relations is a result of its culture, there are valuable concepts that could apply to U. S. businesses. I selected Japanese management principles (like cooperation and teamwork) rather than specific practices (like lifelong employment or Quality Circles) because U. S. businesses could (and should) apply these principles within our culture. I'll say more about the Japanese culture and human relations management in Part III. For now I merely list the important principles for production managers.

Cooperation-Several articles (20:35,13:94) point out the lack of cooperation of U. S. firms. There is a lack of cooperation between individuals and groups within firms, between firms and suppliers, among firms in the same industry, and between firms and government. America's cultural bias stresses the predominance of the individual instead of the group. The "entrepreneur rather than elitist" approach (20:36) stresses competition rather that cooperation. The Japanese show us cooperation and the "pursuit of collective goals is essential" (13:94,35:57).

Cooperation can: streamline operations (reduce oversight management layers) within a firm, increase technological innovation

(R&D consortiums and job training) among firms, provide assured suppliers and improve sub-contractor performance, and promote government support. The Japanese show all of these can improve productivity (35:57).

Flexibility-The Japanese practices of job rotation and broad job structure lead to flexibility. Thus, when market conditions change, the Japanese are able to respond in one-quarter of the time of its U. S. counterparts (1:77). U. S. companies, in part due to their bias toward the individual and lack of cooperation with employees and unions, are not as flexible. A wider breadth of skills and greater process flexibility improve industrial performance; they reduce coordination and retooling cost, improve labor productivity, and produce higher reliability all with a smaller work force (13:89).

Continuous Learning and Improvement-Japanese are always trying to improve the process. They are constantly learning new skills. Change is not a nasty word to them (41:49). Americans receive most of their job skills through formal education, there is little of no on-the-job training (13:88). The Japanese on the other hand are almost always in a training program of some type. The constant learning of new and broader skills enable workers to contribute to the productivity of the firm (13:87).

Participatory Management-The Ringi system and quality circles are examples of successful Japanese participatory management practices. Teamwork is necessary to improve operations and respond to changes. A Harvard Business School study (13:70) showed

Japanese teamwork in the product development process resulted in one-third less time to take a new car from the conceptual stage to the market showroom than a U. S. company. Teamwork speeds the coordination process and allows simultaneous development of product and process design--an area American CEO's claim as one of the weakest in American firms (24:96).

PART III, SURVEY OF AMERICAN TEXTS

In this part, I present the results of a survey of 12 production and operations management text books. Using the questions derived from the literature review (see Appendix A), I determine if production and operations management texts include areas the literature indicates the Japanese have successfully used to enhance their productivity. In this part, I summarize the results. Appendix B provides a table with the results for each individual question.

The 12 texts reviewed were published from 1970 to 1991 and therefore reflect a chronology of what's been taught to production and operations management students over the past 20 years. This allows an examination of the trends in the education of production management students. The 12 texts surveyed in chronological order are:

1. Riggs, James L. Production Systems:Planning, Analysis and Control 1970

2. Moore, Franklin G. Production Management 1973

3. Hopeman, Richard J. Production:Concepts, Analysis, Control 1976

4. Dilworth, James B. Production and Operations Management: Manufacturing and Non-manufacturing 1979

5. Lewis, C. D. Operations Management in Practice 1981

6. Schroeder, Roger G. Operations Management: Decision Making in the Operations Function 1981

7. Adam, Everett E. and Ronald J. Ebert Production and Operations Management 1982

8. Buffa, Elwood S. Modern Production/Operations Management 1983

9. Vollmann, Thomas E., Thomas L. Berry and D. Clay Whybark Manufacturing Planning and Control Systems 1988

10. Chase, Richard B. and Nicholas J. Acquilano Production and Operations Management: A Life Cycle Approach 1989

11. Krajewski, Lee J. and Larry P. Ritzman Operations Management: Strategy and Analysis 1990

12. Vonderembse, Mark A. and Gregory P. White Operations Management: Concepts, Methods and Strategies 1991

Table 1 summarizes the results of the survey.

	70	73	76	79	81	81	82	83	88	89	90	91
Business Strategy												
Production Focus	N	N	P	N	Y	P	P	Y	P	Y	Y	Y
Short-Term Bias	N	N	N	N	N	N	N	N	P	P	Y	P
Performance Measurement	N	N	N	N	P	N	N	P	P	P	Y	Y
Research & Development	N	P	P	N	N	N	N	P	N	P	P	P
Productivity	N	N	N	N	N	Y	P	Y	N	Y	Y	P
Jap. Production Processes												
Just-in-Time	N	N	N	N	N	N	N	P	Y	Y	Y	Y
Total Quality Mgt.	N	P	P	N	P	P	N	P	N	Y	Y	Y
Manufacturing Flexibility	N	N	N	N	N	N	N	P	Y	Y	Y	Y
Vertical Integration	N	P	P	N	P	N	N	N	Y	Y	Y	Y
Human Resources	N	N	P	N	N	N	N	N	N	P	Y	Y

Table 1
Summary of Survey Results

A Y (for yes) indicates complete coverage of the question, a P (for partial) indicates partial coverage and an N (for no) indicates omission. The remainder of this part discusses the findings in each of the major survey areas.

PRODUCTIVITY

As Table 1 (and Appendix B) shows, only in the last four years have production texts acknowledged that production management is a key factor in improving America's productivity and competitiveness. Although some texts in the early 80's cited the productivity decline, they did not really consider production management as part of the cause. They cited macroeconomic or other causes (for example the lack of research and development). Not till the MIT Commission and their Made in America report did production text writers acknowledge production management's role in productivity. Chase and Acquilano included excerpts from Made In America in their text (9:36) and Krajewski writes, "ultimately the management and employees of individual organizations are responsible for productivity gains" (29:11).

BUSINESS STRATEGY

Again only the latest texts emphasize the importance of production management in business strategy. However once it caught

on, it was emphasized. Krajewski includes a whole chapter on using "operations as a competitive weapon" and Vonderembse includes numerous case studies to show how production management can "gain a strategic advantage".

Earlier texts (pre-1985) were mainly a collection of operations research (quantitative techniques) for decision making without sufficient insight into the decision's strategic implications for the firm. Although many of the mathematical techniques are still included in the later texts, there is a definite trend towards including other than strictly quantitative factors and the role these models should play in the overall strategy of the firm.

Although the later texts addressed operations as part of their strategy, there were gaps in their coverage. None of the texts adequately addressed the short-term bias of American businesses nor the tendency for financial measures as the overriding factor in decision making.

The lack of a longer-run perspective can significantly reduce production efficiencies and reduce competitiveness. To achieve short-term profits, American businesses tend to neglect process development in favor of product development (32:182). Hence the new American products are not produced as efficiently and reliably as Japanese products (13:54). Also American firms choose not to compete in low-cost, high-volume market segments because of the relatively low profit margin. Yet these market niches allow Japanese firms to produce in quantity, thereby achieving scale

economies and learning curve efficiencies (13:55).

A short-term focus also influences capital investment, the level of quality, research and development, supplier relationships, and customer service performance--all areas directly affecting the production manager. Production managers must be aware of the short-term bias of America's businesses and be able to counter this bias to effectively manage his operation.

Another omission the survey highlighted was research and development (R&D). Interestingly, two very early texts (23,36) addressed the management of R&D of the firm. The later texts stressed the importance of considering manufacturability when developing a product, but nothing about managing R&D or the focus of R&D efforts.

Although America is still the world leader in R&D, their focus is on new product or processes rather than improving existing techniques (13:75). R&D must also be applied as "enthusiastically to processes of production" as it is to products (13:134). Also, Americans are relatively slow to innovate--transform an invention to a marketable product. Production managers must play an important role in getting inventions to market by stressing continuous product and process improvement and developing adaptable means of production. Production management and R&D are interwoven and not including R&D in production texts is an omission that should be corrected. Management of R&D must be taught in business schools and it fits best in the production management curricula.

Finally in the area of R&D management, the text should discuss

the diffusion of innovation globally and the need to learn of and exploit new discoveries. The Japanese understand the globalization of innovation and have developed communications and computer hookups with American universities. In order to compete in the future, American companies must emphasize technology transfer and commercialization (32:182).

JAPANESE PRODUCTION PROCESS TECHNIQUES

Although Japanese manufacturing techniques have been successfully used in Japan, Europe, and the U. S. since the 70's, it is only in the last four years that they've been described in the texts. Juran (25,26), Deming (12), Schonenberger (42), and others (Hayes) wrote extensively on Japanese quality, Just-in-Time management and other practices in the late 70's and 80's. Indeed the late 70's and 80's saw an explosion of U. S. firms implementing Just-in-Time and Total Quality management practices (41:767,42). For example, Kawasaki, Hewlett-Packard, John Deere, and Black and Decker all successfully implemented Japanese techniques during this period (41). Yet the texts did not include these practices for another ten years.

Note also from Table 1 the return of purchasing and materials management to production texts. Earlier texts (36,14) included purchasing management and the importance of supplier relationships to production. However the 80's texts excluded those functions; while the 90's texts reintroduced the area. This is probably due

to the heavy Japanese reliance on suppliers and the importance of reliable service by vendors for a smooth flowing production process and for the quality of the ultimate product.

HUMAN RESOURCES

In the area of human resources, production management text's coverage is spotty at best. Only the latest texts include a discussion of Japanese techniques of managing people, however they only provide lip service or caveat their discussions by indicating Japanese techniques "rely on Japanese culture or economic relationships not prevalent in the U. S." (9:754). Thus, there is a tendency to discount Japanese management by saying it won't work in the U. S..

That's pure bunk. First, it has worked in America. Look at Honda in Ohio, Toyota in Kentucky, and Sharp in Ohio for example (34:56). Secondly, Japanese management is not Japanese, it is a common sense management style that can and has worked elsewhere. In fact much of the "Japanese management" was learned from Americans like Deming and Juran. One has only to look at the U. S. military services to see these common sense management concepts at work. The military stresses teamwork and cooperation and working for the "good of the company" and country. The armed services provides continuous learning and a lifetime system of on-the-job training. In addition, leaders are "groomed" (job rotation) and grow from the ranks. Thus, the leaders are focused and know the

operation. My point is not that all U. S. businesses should use the military or the Japanese as a model for the management of its people, but these practices can be--and have been--successful. Students of production should be aware of these concepts.

One might ask why should these management practices be taught in production rather than in organizational behavior classes? The answer is because they directly apply to production management. Teamwork, cooperation, and flexibility are necessary to get the most out of a company' production potential. It's important for each individual worker to reach his full potential and to be focused on the goals of the firm to continue to make American businesses competitive.

The focus of production is quality and productivity. The literature suggests two cultural barriers that impede U. S. production management from improving quality and productivity--individualism and segmentation of job categories (13:82,6:65). To improve quality and increase productivity, we must breakdown these cultural barriers, or stated differently, follow some of the Japanese human resource management principles.

Both the Japanese and Americans indicate a "bottoms-up" approach is the way to improve quality (12,25). These management approaches stress that the individual worker must be part of the process and recommend team approaches (i.e. quality circles) to continuously improve quality. They stress cooperation; with suppliers to improve the quality of the inputs, with management to listen to and adopt quality improvements suggested by line workers,

and with engineering to design high quality products and processes. Individualism leads to less teamwork and cooperation, and production managers must be aware of the effect individualism can have on quality and the management of his operation.

The other cultural barrier--segmentation of job categories--leads to compartimentalization of information and problems, thereby fostering each department to deal with its problems in isolation (6:64). It also leads to job specialization and loss of worker flexibility. Yet the literature shows (13:89) increased worker flexibility and broader job skills increases productivity.

Cooperation, teamwork, and flexibility are keys to improving productivity and quality. They should be an integral part of the production management curricula.

PART IV, SUMMARY

This paper sought to determine if America's production management texts include techniques that the Japanese have successfully employed to increase their productivity and competitiveness. The answer, until very recently, has been no.

Although the Japanese, and indeed American and European companies, have used and are using Japanese production techniques since the 1970s, they've only been included in American texts in the 1990s. The latest texts recognize the importance of production management as a factor in America's productivity performance.

They've identified and included (albeit belatedly) successful Japanese manufacturing practices.

The most important lesson American students and businesses can learn from the Japanese is that engineering and production management are the preeminent skills needed to increase productivity and competitiveness. A lesson Fortune 500 executives have yet to learn. When asked which functional area offered the greatest advancement opportunities, Fortune 500 executives said marketing, finance and general management. Fewer than "5 percent considered production or manufacturing a logical choice" (56:315).

While I can understand (though certainly not excuse) executives who rose to power in the junk bond and merger era of the 1970s and 1980s selecting non-production functional areas, I cannot understand (until very recently) the second-class role production texts assigned to production and operations management.

Previous production texts have done a diservice to production students and the implications are clear--we've reduced our ability to compete. Even economists--long the bastions of macroeconomic causes of the decline in productivity--have come to realize the importance of organization and production management in increasing productivity. Economists have created a new field of economics that studies management's ability to organize operations and their effect on productivity. The literature cites many causes for America's productivity decline and loss of competitiveness:

* Lack of a manufacturing process focus on research and

development

* Non-competitive manufacturing
* Lack of manufacturing flexibility
* Poor quality and service
* Unable to market (or too long to market) innovations
* Failure to invest in productivity enhancing capital.

All of these areas are the domain of the production manager.

All is not lost however, the latest texts recognized the need to stress production and operations in business strategy. Although they have come a long way in including material that will improve America's production management skills, there is still a ways to go. We need more research and teaching in the areas that fall between traditional business disciplines. For example, more is needed on the interface between organization behavior and production management and between engineering and innovation and production management.

But if American business reflects what they've been taught in their colleges and universities (and if college texts are a good representation of what is taught in our colleges), there is reason for optimism in the future.

APPENDIX A

SURVEY QUESTIONS

A. Productivity

1. Is there a discussion of the U. S. productivity decline?

2. Does it compare U. S. productivity performance to other nations, especially to Japan?

3. Does it cite production and operations management as one of the contributing factors?

B. Business Strategy

Production Focus

1. Does it discuss business strategy?

2. Does it indicate production and operations management should be a focus of business strategy?

3. Does it recommend the integration of production with marketing and engineering in product and process design?

Short-term Bias

4. Does it discuss the short-term bias of business decision making and its effect on productivity?

Performance Measurement

5. Does it discuss the importance of measuring performance of the production management function?

6. Does it include the need to balance short-term and long-term performance measures?

7. Does it include production performance measures for the firm (not just for the production department)?

Research and Development (R&D)

8. Does it discuss the focus of R&D on product and process technologies?

9. Does it recommend a multi-disciplined team approach to product development?

C. Japanese Production Process Techniques

1. Is Just-in-Time production described?

Stockless Production

2. Does the text describe a stockless (Kanban) inventory system?

3. Does it include reducing set-up times?

4. Does it describe the concept of "continuous improvement"?

Total Quality Management

5. Does it describe the worker's role in quality?

6. Is competitive benchmmarking discussed?

7. Does it address quality from the raw material to the final product stage including customer service?

8. Does it address how to measure quality?

9. Does it address customer audits?

Vertical Integration

10. Does it discuss the Japanese success in vertical integration?

11. Does it include the advantages and disadvantages of vertical integration (either ownership or long-term relationships)?

Manufacturing Flexibility

12. Does it discuss including manufacturability with product design?

13. Does it discuss the Japanese broader job structure and the flexibility of its work force?

14. Does it discuss reducing set-up times and the goal of reducing the lead time to change the manufacturing process?

15. Does it include a summary of successful Just-in-Time systems implemented in the U. S. or Europe?

D. Human Resources

Cooperation

1. Does it discuss how cooperation can lead to increased productivity? Cooperation within the firm, with suppliers, with government?

2. Does it discuss the conflict between individual interests and a teamwork approach to problem solving? Or does it discuss the Japanese human relations management style and culture?

Flexibility

3. Does the text show greater flexibility in the work force can lead to greater productivity and a greater ability to change?

Continuous Learning and Improvement

4. Does it emphasize the need for continual learning of new skills and developing on-the-job training programs?

5. Does it discuss job rotation or the need for managers with a breadth of experience?

Participatory Management

6. Does it emphasize teamwork is necessary especially to implement change?

APPENDIX B

SURVEY RESULTS

This Appendix presents the results of a survey of 12 American production and operations management texts. I determined if the production and operations management texts adequately address the survey questions (Appendix A) that the literature review indicated are key areas for improving productivity.

The 12 texts reviewed are listed below in chronological order:

1. Riggs, James L. Production Systems: Planning, Analysis and Control 1970

2. Moore, Franklin G. Production Management 1973

3. Hopeman, Richard J. Production: Concepts, Analysis, Control 1976

4. Dilworth, James B. Production and Operations Management: Manufacturing and Non-manufacturing 1979

5 Lewis, C. D. Operations Management in Practice 1981

6. Schroeder, Roger G. Operations Management: Decision Making in the Operations Function 1981

7. Adam, Everett E. and Ronald J. Ebert Production and Operations Management 1982

8. Buffa, Elwood S. Modern Production/Operations Management 1983

9. Vollmann, Thomas E., Thomas L. Berry and D. Clay Whybark Manufacturing Planning and Control Systems 1988

10. Chase, Richard B. and Nicholas J. Acquilano Production and Operations Management: A Life Cycle Approach 1989

11. Krajewski, Lee J. and Larry P. Ritzman Operations Management: Strategy and Analysis 1990

12. Vonderembse, Mark A. and Gregory P. White Operations Management: Concepts, Methods and Strategies 1991

Note the texts were published from 1970 to 1991, thereby reflecting a chronology of what's been taught to production and operations management students over the past 20 years. This allows a review of the trends in the education of production management students.

The table in this appendix indicates the degree each survey question was answered by each text. A Y (for yes) indicates complete coverage, a P (for partial indicates partial coverage, and an N (for no) indicates omission.

	70	73	76	79	81	81	82	83	88	89	90	91
Productivity												
1. Productivity Decline	N	N	N	N	N	Y	Y	Y	N	Y	Y	N
2. Compare to Others	N	N	N	N	N	Y	Y	Y	N	Y	Y	N
3. Productivity in the Course	N	N	N	N	N	Y	N	Y	N	Y	Y	P
Business Strategy												
Productivity Focus												
1. Business Strategy	N	N	Y	N	Y	Y	Y	Y	P	Y	Y	Y
2. Production Focus of Strategy	N	N	P	N	Y	P	N	Y	P	Y	Y	Y
3. Integrate Product and Process	N	P	N	N	Y	P	P	Y	Y	Y	Y	Y
Short-term Bias												
4. Effect on Productivity	N	N	N	N	N	N	N	N	N	P	Y	P
Performance Measurement												
5. Production Performance Meas.	N	N	N	N	P	P	N	Y	Y	P	Y	Y
6. Short and Long Term Balance	N	N	N	N	N	N	N	P	N	P	Y	P
7. Production Perf. of Firm	N	N	N	N	N	N	N	P	P	P	Y	Y
Research and Development (R&D)												
8. R&D Focus	N	P	P	N	N	N	N	P	N	P	N	N
9. Multi-disciplined Approach	N	N	N	N	N	P	N	P	N	P	Y	Y

	70	73	76	79	81	81	82	83	88	89	90	91
Japanese Production Process												
1. Just-in-Time Described	N	N	N	N	N	N	N	P	Y	Y	Y	Y
Stockless Production												
2. Stockless Inventory	N	N	N	N	N	N	N	P	Y	Y	Y	Y
3. Reduce Set-up Time	N	N	N	N	N	P	N	P	Y	Y	Y	Y
4. Continuous Improvement	N	N	N	N	N	P	N	P	Y	Y	Y	Y
Total Quality Management												
5. Worker's Role	N	N	N	N	N	Y	P	Y	N	Y	Y	Y
6. Competitive Benchmarking	N	Y	P	N	N	N	N	N	N	N	P	P
7. Quality Start to Finish	N	N	N	N	Y	P	N	P	N	P	Y	Y
8. How to Measure Quality	P	P	P	N	P	Y	P	Y	N	Y	Y	Y
9. Customer Audits	N	N	N	N	P	N	N	N	N	N	Y	Y
Vertical Integration												
10. Japanese Success	N	N	N	N	N	N	N	N	P	Y	Y	Y
11. Advantages and Disadvantages	N	P	Y	N	P	N	N	N	Y	P	Y	Y
Manufacturing Flexibility												
12. Manufacturability with Design	N	N	N	N	N	N	N	P	Y	Y	Y	Y
13. Job Structure and Flexibility	N	N	N	N	N	N	N	P	Y	Y	Y	Y
14. Reduce Set-up and Lead Times	N	N	N	N	N	N	N	P	Y	Y	Y	Y

	70	73	76	79	81	81	82	83	88	89	90	91
15. Summary of Successful JIT	N	N	N	N	N	N	N	P	Y	Y	Y	Y
Human Resources												
Cooperation												
1. Cooperation Increase in Productivity	N	N	N	N	P	N	N	N	N	P	Y	Y
2. Individual vs Team Approach	N	N	P	N	P	N	N	N	N	P	P	Y
Flexibility												
3. Flexibility in Workforce	N	N	P	N	N	N	N	N	Y	Y	Y	Y
Continuous Learning												
4. Continuous Learning	N	N	N	N	N	N	N	N	N	Y	Y	Y
5. Job Rotation	P	N	N	P	N	P	P	P	N	P	P	P
Participatory Management												
6. Emphasize Teamwork	N	N	Y	N	N	N	N	P	N	P	Y	Y

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