AN EXPLORATION OF MANAGEMENT IMPROVEMENT PROGRAMS

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ABSTRACT

Today's competitive environment forces most businesses to search for ways to reduce costs, improve quality, reduce response times in delivery and new product development, and increase their flexibility and agility. In the past half-century, one of the most popular, and effective, ways of gaining these improvement objectives, is with what has been designated in the literature as management improvement programs.

A REVIEW OF MANAGEMENT IMPROVEMENT PROGRAMS

As the name implies, management improvement programs are designed to improve some aspect of business operations. They are supplemental activities. In other words, they do not exist until somebody decides they need to be there. For example, most companies are concerned about providing their product or service to the customer in a reasonable amount of time. However, company management may sense that they could improve in this aspect of running their business by providing their product or services in a timelier manner. To address this need for improvement, management may decide to implement a special program to help them accomplish this goal. Such a program could be a QRS or quick response systems. Hence, a special program now exists to improve this aspect of management.

Management improvement programs are usually assigned a name to distinguish them from the normal operations of a business. Often they are known by an acronym, such as ERP (enterprise resource planning), WMS (warehouse management systems), or APS (advanced planning and scheduling). Such acronyms are useful because they help us remember the name of the program better, and in normal conversation and writing, it is easier to use letter abbreviations when making multiple references to the same program. We will try to refrain from designating management improvement programs as MIPs.

Beyond the acronyms and early hype, it is important to remember that management improvement programs are concentrated efforts to improve some aspect of business operations. Examples of potential improvement areas include reducing costs, improving product quality, or shortening response time to the customer. They may involve a part or all of an organization. Usually, they are of a project nature, with a beginning, a life cycle, and an end.

Management improvement programs originated as an attempt to introduce improvement into a business. Sometimes, a program may originate in a particular company. For example, Japanese automaker Toyota started an improvement program to reduce inventory and improve cash flow by revamping their production system. This program was first known as the Toyota Production System (TPS) and then by a variety of other names, such as stockless production and zero inventories. Later, this program achieved widespread acceptance and eventually became known as the Just-in-Time (JIT) system.

In most cases, a management improvement program is an adaptation of an existing program that has become popular, or at least reasonably successful in other companies. As a result, most programs begin

small to address a specific need. If successful, they often expand into a much broader program to become embedded into the day-to-day operations of the company. In other words, it becomes a management philosophy that is part of the way organizations operate on a regular basis, not just as a special program.

WHY ARE MANAGEMENT PROGRAMS IMPORTANT?

Management improvement programs have been widely successful in a number of companies and throughout a vast array of industries. However, not all implementations of these programs have been successful in every company. Implementing a management improvement program does take some planning and careful implementation. Management improvement programs are important to the running of a business. This does not mean every company needs every program; only certain types of programs are necessary to improve most business operations.

Look at how a management improvement program fits into the general scheme of things. A manager deals with three types of activities: (1) maintaining the smooth flow of normal day-to-day operations, (2) correcting problems that arise when these day-to-day operations run awry, and (3) making improvements in these operations (when time permits). The first set of activities probably consumes most of a manager's time; the smooth running of a department, plant, unit, or organization is their primary concern and responsibility.

It is rare that daily activities will run smoothly for very long. Problems arise; that is a natural outcome of even normal operations. At this point, a manager turns attention to addressing the problem at hand. Day-to-day operations continue; the manager must shift attention to remedying the disruption. It is the second set of activities described above. Examples of such problems abound, and they are usually unique given the industry in which you operate. In a retail setting at the store level, you may need to address the following situations:

- Setting up a contractor to fix the leaking roof
- Assisting a customer who has slipped on the floor
- Filling in for an employee who has called in sick
- Calming down an irate customer who has returned some defective merchandise
- Evacuating the store of customers when the power goes off.

However, if you are in mid-management, your set of problems may be much different. Your normal day-to-day operations may be affected by the following:

- Finding someone to operate a store when that manager must be hospitalized
- Re-scheduling a company sales promotion when a snowstorm delays delivery
- Coordinating efforts to get a store up and running after a fire
- Getting a cell phone call to hear the company CEO has just died of a heart attack
- Hearing a major supplier has raised prices because of escalating oil prices.

In the manufacturing sector, other areas can disrupt normal activities:

- Trying to maintain production when a major piece of machinery goes down
- Informing a major customer of a price increase because of rising component costs
- Addressing the cause of an employee injury on the manufacturing line
- Finding and analyzing the cause of a product defect
- Handling an employee grievance filed by the shop steward.

Regardless of your managerial level, or your industry, there is no doubt that problems like these can take a great deal of time to resolve. Between the activities described in the first and second category above, you may find that your days are full, with little time left over for reflection on how to actually improve

business activities. Instead, you may feel like the kind of manager that is always running around, putting out fires.

How desirable it would be to actually have time to reflect on ways to improve operations so some of those items described above would not occur in the first place. Yet, this is the essence of the third category of activities, to improve managerial operations. There is an irony in this discussion that almost sounds like a mathematical equation; the problems that occur in the second category, within the context of the first category (normal day-to-day operations) can be addressed by solutions from the third category (management improvement programs). We could then look at it this way:

Normal day-to-day operations + problems = the need for management improvement programs

The left side of the equation indicates a manager's day consists of daily operations, plus an abundance of problems thrown in. Although it is common to think of these problems as being mostly negative events, they can also be an opportunity for learning and change in your organization (Wang, 2008). The right side of the equation shows the need to be on the lookout for ways to improve things, hence, the need for management improvement programs. As a manager, it is not enough to operate on the "left side"; you need to be on the "right side" as well.

HOW DO MANAGEMENT IMPROVEMENT PROGRAMS RELATE TO BUSINESS OPERATIONS?

Where do management programs fit in with running a business? Every business participates in a number of supply chains, both as a transformer of goods and provider of services, as well as being a supplier or customer to other businesses. To understand the complexity of business operations today, one must see this inter-connectivity of activities. Each of the five facets of the supply chain will be discussed from the context of day-to-day operations, problems, and management improvement programs.

Suppliers

Suppliers provide raw materials for the production process and represent an ongoing, living relationship with your company. The word relationship is important, because when this relationship is strained, business transactions between your supplier and your company will also be strained. Such a strain leads to the general problem of poor coordination activities between your company and your supplier. The result can be missed orders, late deliveries, price fluctuations that are harder to predict, and perhaps poor quality of products delivered from your supplier

Fortunately, poor supplier relationships can be improved with a program of supplier relationship management (SRM). The goal of this management improvement program, as the name implies, is to improve long-term relationships with a company's suppliers.

Inputs

We have listed inputs separately to show that when your company receives supplies, it must store those supplies somewhere. In normal day-to-day operations, storage can be seamless when supplies are always available and not accumulating to the point where they can be damaged or spoiled. However, a number of problems can occur to inventory. Depending on how inventory storage is set up, there may be too little inventory, or too much. Of course, too little inventory can cause delays in production and dissatisfied customers. Too much inventory can raise your storage costs, which ties up money that could be used somewhere else in running your company.

Fortunately, there are management improvement programs that can address these very problems. Warehouse management systems (WMS) for example seek to address issues that arise when moving goods into and out of storage. These programs also include the use of technology, both physical and software, to help develop the optimum methods of controlling inventory once it is in-house.

Transformation

In the transformation process, your company is actually making the product, or providing the service. In addition, many companies today realize they are BOTH a manufacturer and a service provider, a phenomenon we call the vanishing boundary between service and manufacturing (Crandall & Crandall, 2008). For example, manufacturers not only make a product, but they must provide aftermarket service for their customers, as in the case of computer hardware and software.

The transformation process can be plagued with a number of problems including rising production costs, excessive work-in-process inventory, and slow manufacturing cycles. Once again, there are management improvement programs that can systematically address these problems. JIT and its follower, lean manufacturing, are programs that address these types of production issues.

Outputs

Outputs are the actual products or services that your company provides. Usually, we think of outputs as being a tangible good placed in the hands of the customer. Typical problems that arise with outputs tend to be quality related – a product has a defect, or it does not perform as well as the customer would like. A number of management improvement programs exist to address quality issues, including statistical process control (SPC), total quality control (TQC), total quality management (TQM), quality function deployment (QFD), and Six Sigma.

A secondary set of problems relates to the usability of the product in relation to its features. In this scenario, there is nothing wrong with the product in terms of quality, but the features do not match what the customer desires. This is problematic to manufacturers who want long stable production runs in order to keep costs down. However, the demands of the customer dictate that a number of products be built, often with common platforms (such as an automobile), but with small lots of product with different features (or bells and whistles as they like to say in the automobile industry). Two management programs address this dilemma – agile manufacturing and mass customization. The goal of these programs are to help management set up manufacturing systems that can address the finicky needs of customers, while maintaining some semblance of mass production.

Customers

Ultimately, the product or service a company produces must be delivered into the hands of the customer. A common problem at this point is to deliver the goods in a timely manner. It is not enough for a company to produce a high quality product at a decent price; the delivery of that product must be done expediently. This time-based competition can put a company at a competitive disadvantage if it is not able to perform up to the expectations of its customers. Fortunately, there are several management improvement programs that address this very problem – quick response systems (QRS) and efficient consumer response (ECR).

There is another area of consumer relations to consider. Some businesses have taken the attitude that their customers are not just casual sources of revenue but capable of forming a long-term relationship with the company as well. An abundance of consumer information is available to the company by cultivating these ongoing relations with their customers. Not surprisingly, a systemized management

improvement program is available to help facilitate these relationships, customer relationship management (CRM).

By looking at the supply chain, we can quickly see applications of management improvement programs. You might have noticed that some of these programs overlap several areas of the supply chain. Indeed, most programs follow a wider scope than described above. For example, JIT and its successor, lean production has an influence on almost EVERY area of the supply chain, not just the transformation function. Nonetheless, we offer this introductory framework to suggest applications of where the use of these management programs is most likely.

Management improvement programs are here to stay. They have a unique ability to address specific types of problems in an organization. However, few management improvement programs are originals; they have origins that go back to early management thought.

HOW MANAGEMENT IMPROVEMENT PROGRAMS EVOLVED

To understand the evolution of management improvement programs, it is necessary to take a brief look at management history. Table 1 will serve as a basis of operation for the pages that follow. According to management historian, Daniel Wren (1987), management history can be divided into four segments of time: early management (the pre-scientific period), the scientific management era, the social man era, and the modern era. We discuss each of them below to illustrate how they eventually led to the onset of management improvement programs.

Table 1. Management Eras and the Onset of Management Improvement Programs

Management Era[1]	Key Ideas During the Era
Pre-scientific Period (1770s-1880s)	• The Industrial Revolution starts in England and eventually spreads to the United States • The field of management develops as large groups of employees are working in the same factory, which is resulting in larger than ever organizations
Scientific Management Era (1880s - present)	• Scientific Management develops – seeking to find the one best way to do things, particularly in the area of manufacturing and the trades such as bricklaying • Administrative Management develops – putting structure and organization into the organization
The Social Man Era (1920s - present)	• The Human Relations Management movement begins • New ways to design jobs and motivate employees becomes important
The Modern Era (1960s - present)	• The field of management science develops • Systems theory attempts to reconcile the various approaches to management • Contingency theory seeks to adapt management practices to the individual organization • Management Improvement Programs emerge. These programs utilize systems and contingency theory to solve problems in the management sciences

These management eras are developed from the framework by Wren, D., & Bedeian, A. (2008). *The Evolution of Management Thought* (6th Ed.). Hoboken, New Jersey: John Wiley & Sons, Inc.

Early Management Thought (Pre-scientific period: 1776 to 1886)

Early management thought dominates the period up to the Scientific Management period. The period from 1776 to 1886 marked the introduction of large-scale manufacturing to the industrial landscape. In reference to management improvement programs, the period during the industrial revolution is especially important, as this era marked the transition from a craft/agricultural economy to one based on large factories. While the industrial revolution started in England, it later carried over to other parts of Europe and the United States.

The transition to factory life meant that new ideas were needed to manage these larger facilities. For the first time in modern history, large groups of employees were now working under one roof. This transition meant that manufacturing processes needed to be standardized and speeded up as well. It is this need that marks the origins of modern management improvement programs, as all programs focus on the need to improve some aspect of the management process.

A number of interesting personalities emerged during the pre-scientific management era. Among our favorites is Charles Babbage, the father of modern computing. He was also considered "the irascible genius" (Wren, 1987: 58), due mainly to his eccentric nature. Babbage laid the groundwork for the field of management science. He invented a crude computer, a device he called the "analytical engine", which performed functions that mimicked today's modern computers.

Early management thought and management improvement programs

The early management thought period saw the formation of large factories. Within this context, most modern management improvement programs began in the manufacturing sector. However, the large factories created three major problems, 1) inefficiency, 2) organization effectiveness and 3) exploitation of workers. The scientific management era, discussed next, addressed the inefficiency problem.

The Scientific Management Era

The scientific management era stressed the need to find standardized processes in manufacturing. Frederick W. Taylor (1856–1915) is considered the father of scientific management because of his research in work methods studies. His approach was based on the idea that any job can be improved by breaking it down into its basic elements, examining each of the job elements, and then finding ways to improve the job. In essence, scientific management was one of the first management improvement programs.

The principles of scientific management include:

1. Scientifically study each part of the job task and develop the best method for performing those tasks.
2. Carefully select the workers and train them to perform the task by using the scientifically developed method (from the first step above).
3. Follow up with the workers on a regular basis to ensure that they use the proper techniques developed above.
4. Divide the work and responsibilities so that management is responsible for planning the work methods while the workers are responsible for actually doing the work.

Taylor's philosophy led to **job specialization**. Indeed, the scientific management approach made possible high-speed, low cost production that plays a great part in the standard of living we enjoy today. Conversely, job specialization carried to the extreme can have significant adverse effects on employees such as absenteeism, lack of motivation, and employee turnover. This occurs because jobs that are highly specialized can become boring and lead to a decrease in motivation.

Two other prominent figures in promoting scientific management were Frank (1868-1924) and Lillian (1878-1972) Gilbreth. The Gilbreths together studied work methods and motion techniques. Their quest led to increased productivity through motion simplification. On the practical side, Frank was an accomplished bricklayer, and set out to find the one best way to lay bricks, a procedure that, up to that time, had been approached in a variety of ways. By using motion studies and identifying basic movements, which he called "therbligs" (Gilbreth spelled backwards); he developed an approach that was more efficient.

The legacy of Frederick Taylor, the Gilbreths, and others within the Scientific Management Era was that work could be done more efficiently. The principle was to break the job task down into its component parts, and then re-assemble the work process in a more efficient manner. Scientific management found its applications primarily in manufacturing industries. However, some applications were eventually

"borrowed" into service industries, particularly fast food restaurants, as operators sought to deliver cooked food quickly to the customer, while maintaining consistency from one store to the next (Crandall & Crandall, 2008).

Administrative management

While scientific management focused on actual work procedures, administrative management addressed the structure and management of the firm. One of the early thinkers in this area was Henri Fayol (1841-1925), a French engineer who progressed through the management ranks in the coal and iron industry during the later part of the nineteenth century and the early part of the twentieth century. Fayol believed managerial functions needed further study and expanded his view by identifying 14 principles of management. During Fayol's time, management as a field of study had not yet been developed. Hence, the principles he described may today seem obvious, but during Fayol's time, they were actually new teachings.

Another pioneer in the Administrative Management theory building was Max Weber (1864-1920), a German sociologist who published his work at the end of the nineteenth century, but was largely unknown in English-speaking circles until the 1920s. He outlined the characteristics of what he called the bureaucracy, a term he used to describe an ideal, modern and efficient organization. Hence, bureaucracy was not a negative term, but a desired state of organizing. Weber's bureaucracy is an important contribution because, like Fayol, it offers a system for setting up an organization into a smooth running, efficient entity.

The scientific management era and management improvement programs

The scientific management era is important to note in the progression towards management improvement programs. Taylor and the Gilbreths emphasized the need to look at efficient manufacturing processes while Fayol and Weber focused on the necessity for sound organizational structure. This two-phase approach refined the inefficiencies created in the early management era, when factories were being built and the process of making durable goods on a large scale was just starting. What was missing was the need to accommodate the welfare of the working employees, a factor that the social man era sought to address.

The Social Man Era

Elton Mayo (1880-1949) turned the lights on to the human relations movement. He was the researcher who offered an explanation to an unusual situation that occurred at the Hawthorne Plant, (a facility of Western Electric), during some experiments on lighting. The experiments took place in the late 1920s and attempted to answer this question – does illumination (i.e., the degree of lighting intensity) have an effect on worker productivity? The prevailing thinking was that it did and that the more the lights were illuminated, the higher worker productivity would become. In fact, some earlier experiments in another facility had confirmed this thinking. However, at the Hawthorne plant, something unusual occurred. As experimenters altered the illumination of the lights, worker productivity did not follow the predicted pattern (Wrege, Gill, & Mundy, 1981). In fact, productivity even went UP as the lights were turned down. In a follow up experiment, the lights were turned down to "the level of moonlight", and productivity still increased (Wren, 1987: 237).

Enter Elton Mayo, an Australian born philosopher and logician who was called on to explain the perplexing findings from the illumination experiment. He theorized that the workers improved, not because of, or in spite of the lights, but for a much deeper reason. Instead, the workers showed improvement because "someone" was paying attention to them, a phenomenon that was later termed, the Hawthorne Effect. Those paying attention to the workers were the researchers present at the plant, who were adjusting the lights, talking to the employees, and asking questions about their work. This added

attention, to an otherwise boring day at work, gave workers satisfaction and motivation, resulting in higher productivity.

The concept of paying attention to the employees for whatever reason was intriguing at the time, as the emphasis in a factory setting was always more on the product output and smooth running machinery, rather than the feelings of the employees. Nonetheless, Mayo's influence later led to the "human relations movement", the belief that valuing workers can have some obvious benefits to the organization. Certainly, some scholars have debated the results of Mayo's findings, but his influence still holds to this day. Evidence of his influence is found in the design of jobs to include task expansion in the form of job enlargement, job enrichment, employee empowerment, and self-directed teams.

Whereas job enlargement is the *horizontal* expansion of a job, **job enrichment** expands an employee's tasks *vertically* into aspects of managerial functions. Job enrichment not only expands tasks upward, but also expands responsibility. It is the most comprehensive of the humanistic approaches to job design, and embodies the three factors that Frederick Herzberg's research indicates enhances job satisfaction: increasing **achievement**, **recognition**, and **responsibility** (Herzberg, 1987).

The social man era and management improvement programs

The human relations movement emphasized that employees are an important part of the firm, and their viewpoints should be respected. This becomes especially important when change efforts are underway in the company. The implementation of management improvement programs (an example of organizational change) requires that all employees, both production and management, have some degree of say in how these programs should be incorporated into the smooth running of the organization. It is a prescription for disaster when management simply mandates that a certain management improvement program is about to be implemented, without considering the viewpoints of the employees.

The Modern Era

A key development during the modern era was the arrival of the field of management science (Wren, 1987). The use of mathematical tools to solve management problems has strong ties with the field of scientific management. That management science developed should not be a surprise. Organizations were getting even larger and more complicated and needed sophisticated techniques to solve the ever-increasing array of operational problems. This observation is important as most management improvement programs have strong roots in management science. Two other developments, systems theory and contingency theory were also major influences of management improvement programs.

Systems Theory

Systems theory was formalized in 1954 when the Society for General Systems Theory, later renamed the Society for General Systems Research, was founded under the leadership of biologist Ludwig von Bertalanffy, economist Kenneth Boulding, biomathematician Anatol Rapoport, and physiologist Ralph Gerard (Schoderbek, Schoderbek, & Kefalas, 1990). Systems theory provided a way to blend elements of the major management theories into packages, or programs. Prior to that time, most researchers and practitioners used a reductionist approach in which they broke a large problem into small parts and attempted to solve the small problems first. Once this was accomplished, the problem components were reassembled into a more workable process.

Systems theory encouraged analysis of not only the problem components, but also the relationships among those components. It has had widespread application in the medical field. For example, the development of vaccines, gene splitting, DNA analysis and organ transplants used a systems theory perspective. Applications of systems theory in science and technology include space travel, weather

forecasting, and digital data transmission. Computerization has facilitated the design and implementation of systems, not only in the sciences but also in business applications. As a result, systems theory has evolved over the latter part of the 20th century into an ever broader and more complex topic.

In the area of management, systems theory has helped to synthesize the application of various management theories. In the early part of the twentieth century, scientific management, administrative management, and human relations management were viewed as complete in themselves and independent of each other. Proponents tended to subscribe to one of these philosophies as a primary managerial approach to running their businesses. Applying systems thinking made it easier to select applicable elements from the different management theories to form a complete systems approach to solving managerial problems. This perspective is important to note because today's management improvement programs are based on a systems theory approach.

Contingency Theory

Scientific management advocated a "one best way" approach to approaching managerial processes and problems. Usually, this best way was the one that was the most efficient in terms of carrying out the process at hand. However, one problem with this approach is that the "one best way" may not fit the needs of all organizations. Consider these scenarios and the potential problems that could result:

- Does one style of leadership fit all types of situations? Do you want the same style of leader who does well training recruits in the Marines, using that same style to manage an R&D unit at a software firm?
- In terms of production processes, is a batch flow setup appropriate for all situations? Likewise, should the assembly line always be used? After all, it is the most efficient in most cases.
- Is a centralized, top-down approach to management appropriate in all situations? While appropriate in a military unit, should it be used in a university academic department?

Obviously, these examples are exaggerated a bit to show that one size does not fit all in terms of management. There are situations where leadership, manufacturing processes, and organizational structure need to be "adjusted" to fit the particular organizational needs.

Contingency theory made it possible to apply a concept, technique or program in a modified format to a particular company to fit their specific needs. Contingency theory originated in the information systems area of management and has been widely extended to other management areas. For example, it supports the position that no single organizational structure – centralized, decentralized, tall, or flat – is best for all companies. Instead, the structure should be adapted to the situation. The most effective applications of management improvement programs are to design and implement them to fit the specific needs of the organization at hand.

The modern era and management improvement programs

As we have seen, the modern era of management thinking builds on the previous eras. These in turn, help lay the foundation for the advent of management improvement programs. Table 2 identifies the influence of the scientific, administrative, and human relations movements on two management improvement programs, Just-in-time (JIT) and total quality management (TQM). Note how each of the three management movements influence the two programs in different ways. This influence is an example of systems theory at work. Note also, how an emphasis is placed on adapting that program to the needs of the individual organization, an application of contingency theory. Table 2 illustrates a theme throughout this paper; the popular management improvement programs of today received much of their content from earlier management theories.

Table 2. Program concepts derived from systems and contingency management theories

	Just In Time (JIT)	Total Quality Management (TQM)
Objectives of the Management Improvement Program	• Reduce in-house inventories • Reduce supplier and customer lead times • Eliminate waste • Pursue continuous improvement • Recognize customer needs	• Reduce the cost of defects • Offer a competitive advantage based on quality • Eliminate waste • Pursue continuous improvement • Recognize customer needs
Source (systems approach)	**Each individual organization must implement the following as it relates to their operations (contingency approach)**	
Scientific Management	• Pull method of material flow • Standardized work methods • Uniform workstation loads	• Continuous improvement • Cost-of-quality • Problem-solving process
Administrative Management	• Product focus • Close supplier ties • Group technology	• Quality as a competitive weapon • Benchmarking • Quality as customer's perception
Human Relations Management	• Flexible work force • Horizontal organization • Teams/employee empowerment	• Self-managing teams • Quality at the source • Cultural change

Adapted from Crandall, R.E., & Crandall, W. R. (2008). *New Methods of Competing in the Global Marketplace: Critical Success Factors from Service and Manufacturing*. Boca Raton, FL: Taylor and Francis, pp. 104-105.

Looking at the management history eras gives us a sense of how improvement programs came into practice. Another useful perspective is to look at the individual management programs in terms of their life cycles. In the next section, we discuss the life cycle of management improvement programs and why that is important for today's practicing manager.

THE LIFE CYCLE OF A MANAGEMENT IMPROVEMENT PROGRAM

Just as the field of management has a history, an individual management improvement program also has a history, or a life cycle with stages such as birth, growth, stability, and then decline. Management improvement programs follow a similar pattern. Successful programs do not actually go into decline; they become part of the day-to-day running of the firm. In other words, the process of the program is no longer new; it is assimilated into the management philosophy of the firm.

How do we know that management improvement programs have a life cycle? Actually, in two ways. First is the common observation that some programs work, and some do not. However, this way is not very scientific. There is another method that is more accurate, but it relies on an indirect approach to tracking a program life cycle – bibilometric data. This refers to how many articles are published about a certain management improvement program.

Tables 3 and Table 4 show the total number of articles listed in the search engine ABI-Inform (Proquest) from 1975 through 2010, for approximately 50 different management improvement programs. The total amount is also reported for each program in the following categories: Trade, Scholarly, Magazines, Newspapers, Reference Reports and Dissertations. See Crandall and Crandall (2007, 2008) and Crandall, Crandall and Ashraf (2006) for further discussion of management programs.

Table 3. Number of Articles for Each Management Program

	Planning				Execution					Cost Reduction					Quality							Quick Response				Flexibility & Agile		
Year	MRP	MRP II	ERP	Project Mgmt	APS	CIM	MES	WMS	TOC	BPO	BPR	JIT	Lean	Value Analysis	SQC	SPC	TQC	QFD	TQM	Six Sigma		QR	ECR	VMI	C(FR	Flexibility	Agility	Mass Customizatio
1975				1										2														
1976	1													4												1		
1977	11			4										1														
1978	12			3										2												3		
1979	26	1		4										2														
1980	18			4										1												3		
1981	29	8		8								1		3	2		1									5		
1982	63	10		4		6						3		1	1		4									15		
1983	79	12		9		12						5		22	1			1								26		
1984	76	15		10		28						41		6	4	15	7									53		
1985	72	41		28		65						66		4	6	31	3					1				73		
1986	63	48		36		120						88	1	13	3	22	5	1								86		
1987	44	41		22		105						82		19	4	32	8	1	3			2				102		
1988	59	52		29		153						108	2	24	4	34	16	9	3			7				126		
1989	74	48		24		145						156	2	13	2	37	17	4	19	6		7				123		1
1990	52	50		23		147						135	11	13	2	41	17	5	61	7		2				110		4
1991	57	56		13		132			4			137	12	7	8	41	15	7	147	10		3				90	1	1
1992	46	47	3	17		65	4	4				120	31	10	5	38	13	7	351	12		8				136	11	8
1993	43	39	4	26		46	17	1	3		23	141	64	6	4	40	6	20	598	9		8	42			121	7	34
1994	43	62	4	19	1	52	18	3	8		65	121	56	8	1	37	2	14	437	8		17	77			145	34	25
1995	37	55	15	11		44	26	21	10		74	118	51	7	2	37		21	369	4		16	72	7		138	26	33
1996	27	24	51	13		31	17	43	6		62	95	67	12		42	3	13	237	7		8	59	9		128	19	43
1997	26	19	152	13	3	22	31	64	14	2	48	92	48	8	1	39	1	7	192	9		5	50	11	2	103	20	42
1998	13	12	577	8	20	20	22	62	16	5	59	76	80		1	41	1	15	167	34		4	35	13	10	133	17	55
1999	18	11	795	7	17	13	11	84	6	39	45	54	93	1	4	26	2	13	135	36		2	13	6	11	100	30	69
2000	18	5	440	6	11	7	16	40	6	10	39	54	97	2	4	20	1	14	137	82		3	12	13	14	107	14	61
2001	9	1	352	9	8	4	23	49	10	11	28	71	145	3		31	1	14	126	104		1	6	8	13	107	16	45
2002	13	3	352	10	4	15	16	83	8	69	21	32	138	8		27		19	138	160		2	14	16	20	135	14	40
2003	9	1	344	17	4	20	7	77	9	154	23	49	180	6	2	30	1	23	109	214		2	16	12	16	135	14	28
2004	10	2	307	14	2	25	23	56	6	189	15	37	240	4		18		24	106	197		2	5	16	8	127	12	39
2005	11	1	377	27	2	12	18	60	22	163	17	49	479	17	4	30		23	99	203		5	5	12	13	140	12	46
2006	14	1	411	30	6	3	28	62	13	179	18	39	545	11	2	37		31	119	231		2	5	10	7	116	14	62
2007	12	1	328	23	8	7	30	59	14	153	12	44	569	8	1	34		28	81	194		2	3	20	6	98	16	44
2008	16	1	390	17	9	4	45	65	15	256	23	36	631	12		32		30	93	194			4	32	2	88	10	57
2009	7	2	258	13	5	2	12	48	19	110	10	31	443	15	2	35		23	69	157		1	2	21	3	72	9	28
2010	7		351	10	7	5	14	32	13	152	19	35	512	10		23		30	92	412			3	18	7	57	9	35
Total	1115	669	5511	512	107	1310	378	913	202	1492	601	2116	4497	285	70	870	124	397	3888	2290		110	423	224	132	3002	305	800

Table 4. Number of Articles for Each Management Program (continued)

	Measurement				IT and Related Programs									Integration						Management							
Year	ABC	ABM	BSC	KPI	AIS	B2B	B2C	DSS	EDI	IOS	SOA	SaaS	Cloud computing	CRM	NPD	PLM	S&OP	SCM	SRM	Chaos	KTS	MBO	Risk Mgmt	Strateg	Sustain	Virtual	Total
1975																						11	28	1			43
1976																						28	18				52
1977								1														20	25	1			63
1978								1	1									2				21	41	1			87
1979								2										3				15	58	1			112
1980								7							1			5				11	77	19			146
1981								23	1									5			1	15	98	23			223
1982								49	3									11				18	85	22			295
1983								69							1			13				11	80	17			358
1984								74	2						1			15				8	135	45			535
1985					1			82	11						3			20				7	147	29			690
1986					1			66	31						4			19			2	10	171	31			821
1987					1			72	70						4			23				6	184	27			852
1988					1			58	179	3					5			20		2		5	212	40		1	1152
1989	3				5			65	305	1					7			39				5	210	33	2		1353
1990	19							49	320	2					1			31		2	2	1	177	40	3		1327
1991	51							58	276	1					3			47		5		6	167	38	1		1394
1992	57	7	5	1	1			47	335	5					8			57		3	3	4	187	46	2		1704
1993	64	13	2	1	9			62	350	4					3		1	110		5		1	232	61	6	1	2227
1994	87	11	9	1	4	1		56	356	4				1	9		4	196		4	2	2	274	85	4	11	2378
1995	66	17	4	1	4			37	350	5				2	13		2	251		7	7	2	233	84	4	15	2298
1996	71	13	31		12			42	359	4					12		1	431		15	8		266	64	2	6	2353
1997	72	21	48		15	1		40	338	5				3	27		2	666		10	2	1	290	51	16	17	2649
1998	66	19	60	2	20	10		45	317	6				19	29		2	1123		15	7	1	459	64	15	14	3789
1999	53	18	54	2	53	46	5	51	206	6				209	24		1	1411	1	12	19	2	373	42	22	11	4262
2000	43	12	88	4	35	1487	161	25	135	6				495	29	1	2	1612		8	21		392	49	31	17	5886
2001	39	10	95	2	48	1120	111	27	144	7	1			934	25	4	4	1915	9	6	21	2	433	46	32	23	6253
2002	49	8	111	8	113	505	59	35	84	1	2			749	39	18	3	1789	15	14	19	1	593	56	48	14	5690
2003	45	2	146	11	438	429	33	33	75	9	16			584	52	43	6	2018	13	13	41	3	608	79	71	13	6283
2004	30	6	132	14	807	430	41	44	72	7	64	1		367	60	48	8	2147	9	9	40	2	685	57	58	7	6629
2005	39	6	243	17	1051	539	36	38	71	12	142	23		743	69	66	6	2520	7	10	39	3	903	48	82	12	8572
2006	22	2	235	18	793	442	22	39	43	4	345	99		578	74	80	7	2653	13	29	54	2	962	39	97	7	8655
2007	36	5	197	28	586	485	37	52	25	12	293	168	6	539	77	109	13	2592	8	17	59	3	1054	38	155	6	8395
2008	34	3	202	22	574	737	56	55	46	7	292	428	147	650	68	106	19	3387	12	27	79	2	1875	37	282	5	11214
2009	21	1	147	27	314	379	28	42	24	7	80	347	472	395	74	83	16	2327	3	18	61		1200	32	217	7	7719
2010	36	4	53	32	294	477	28	35	35	2	85	441	1263	442	81	74	12	2884	5	37	97	1	2699	18	306	11	11305
Total	1003	178	1862	191	5180	7088	617	1481	4564	120	1320	1507	1888	6710	803	632	109	30342	95	268	584	230	15631	1364	1456	198	117,764

The highlighted cells in Tables 3 and 4 represent the year in which the largest number of articles were published, or the peak of the program's life cycle. Collecting the data shown in the tables is a dynamic effort; the numbers change from time to time with the addition or elimination of sources; however, the numbers shown are the result of a diligent effort to be accurate.

Plotting the number of articles written exclusively about a single management program versus the years in which the articles were published, results in a curve such as shown in Figure 1. Figure 1 shows a plot for JIT and Lean manufacturing. Articles on JIT began to appear in the early 1980s. The underlying concept of JIT had been known as the Toyota Production System (TPS), stockless production and other similar designations following its development in the 1960s by Toyota. JIT gained in popularity (published articles) until its peak about 1990. In the meantime, articles about lean manufacturing began to appear about 1990 and have outpaced JIT in popularity in recent years.

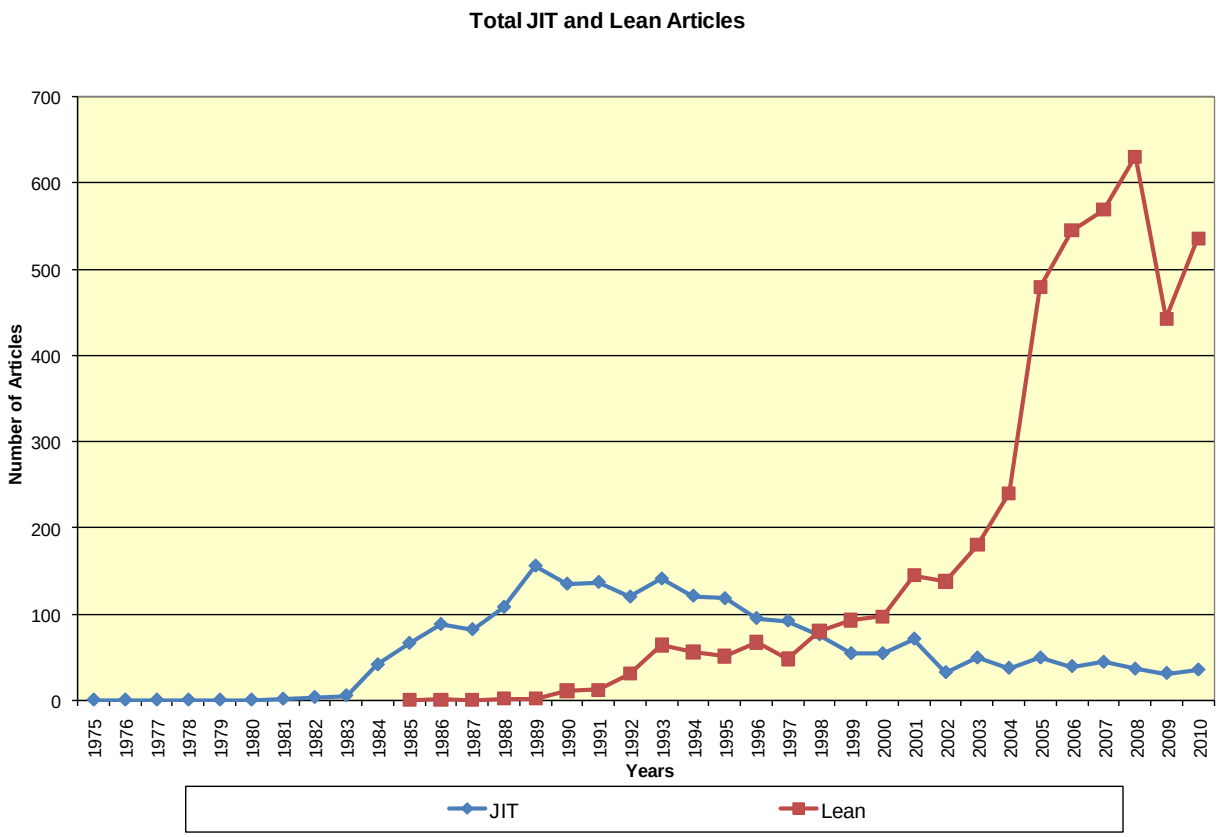

Figure 1. Number of Articles Published for JIT and Lean

Most research indicates a bell shape curve as the most common life cycle form (Abrahamson, 1996: Spell, 2001). Intuitively, this makes sense, as the interest in a program starts out slow and then grows; the number of articles published about that program will gradually increase. You can see this in the graph for JIT as a rising curve going from the lower left to the upper right. At some point, the number of articles hits a peak, and then descends to the lower right hand corner of the graph. Hence, a full life cycle can be plotted using the number of articles written about that management improvement program.

However, some researchers think an S-shape curve is also possible (Ponzi & Koenig, 2002). This observation is feasible if one remembers that a life cycle can sometimes have a resurgence of activity near the end of its perceived useful existence. Taking this observation to management improvement programs, we can see in Figure 1 that a later form of JIT, lean production, adds an upward spiral to give the curve its unique S-shape.

Sometimes, the slope of a curve will vary in its steepness. Carson and associates acknowledge that shapes will vary in slope rates because other active management programs may influence the particular item under study (Carson, et. al, 2000). However, a shape of some kind is plausible, most likely one that resembles a bell curve.

Life Cycle Stages

In addition to the shape, the stages of the life cycle are also of interest. Barbara Ettorre (1997) shows improvement programs progressing through a five-stage life cycle:

1. **Discovery** – "A buzzword is born". This is the stage where the new program gains recognition in the market. Consultants and popular management writers espouse the benefits of these new programs as something new and exciting that every manager should try.
2. **Wild Acceptance** – "The idea catches fire". The number of adopters of the program increases dramatically. Many of these programs will be successfully implemented into organizations, while a few may not.
3. **Digestion** – "The concept is subject to criticism". At this stage, users and non-users such as academics (university researchers and professors like us) will begin to question and critique the merits of the management improvement program. While the wild acceptance stage focused on only the benefits of the management improvement program, the digestion stage will critically evaluate the program from a more unbiased perspective.
4. **Disillusionment** – "The idea does not solve all problems". Shortcomings of the program become readily apparent. Interest and adoption decreases. This stage can occur for two reasons. First, the program may not actually be that good to begin with. Secondly, the program might not have been implemented well.
5. **Hard Core** – "Only true believers remain." Interest in the program is limited, with only a few adopters still practicing the remnants of the program.

The Gartner Research Group offers another way of looking at the life cycle stages. They developed a "hype cycle" with the following phases – Technology Trigger (beginning), Peak of Inflated Expectations (growth), Trough of Disillusionment (decline), Slope of Enlightenment (revival), and Plateau of Productivity (sustained level) (Fenn & Linder, 2005).

Both descriptions above follow a five-stage life cycle. Keep in mind that the length of the life cycle will vary. In the management research literature, programs with short life cycles are called fads while the more durable ones are considered fashions (Abrahamson, 1996).

The Beginning of the Life Cycle

What starts a program's life cycle? Many popular management programs originated as a focused effort within a company to address a specific problem. Examples include JIT at Toyota or Six Sigma at Motorola. The program may have been designed internally or with the aid of a consultant. Often, consultants package the program as an addition to their product line and promote the program to other potential clients.

In the early stages of a management improvement program, consultants and trade publications are often the primary sources of information about the program. A typical way for other practitioners to find out about the program is to attend conferences and workshops offered by consultants or trade associations. Reading trade publications is another way to learn about these programs.

In the early stages of the life cycle, trade publication articles about the program are usually positive and describe the benefits of implementing such a program. This is not surprising, as both consultants and the companies that are using these programs are generating publicity for themselves. As time goes on, business researchers in higher education begin to study the program and view it with greater objectivity. Their role is more reflective as they seek to analyze the program elements and identify the major causes of success or failure (Crandall, Crandall, & Ashraf, 2006). They often compile survey information that summarizes the actual results achieved, often reflecting a range of results, from high success to low success or even failures of the program.

Figure 2 shows the relationship between trade and scholarly articles. As described above, trade articles lead and have their own life cycle. In Figure 2, trade articles peaked about 2008; yet scholarly articles

continue to increase and may eventually exceed the number of trade articles. Some management programs attract scholarly attention; a few do not.

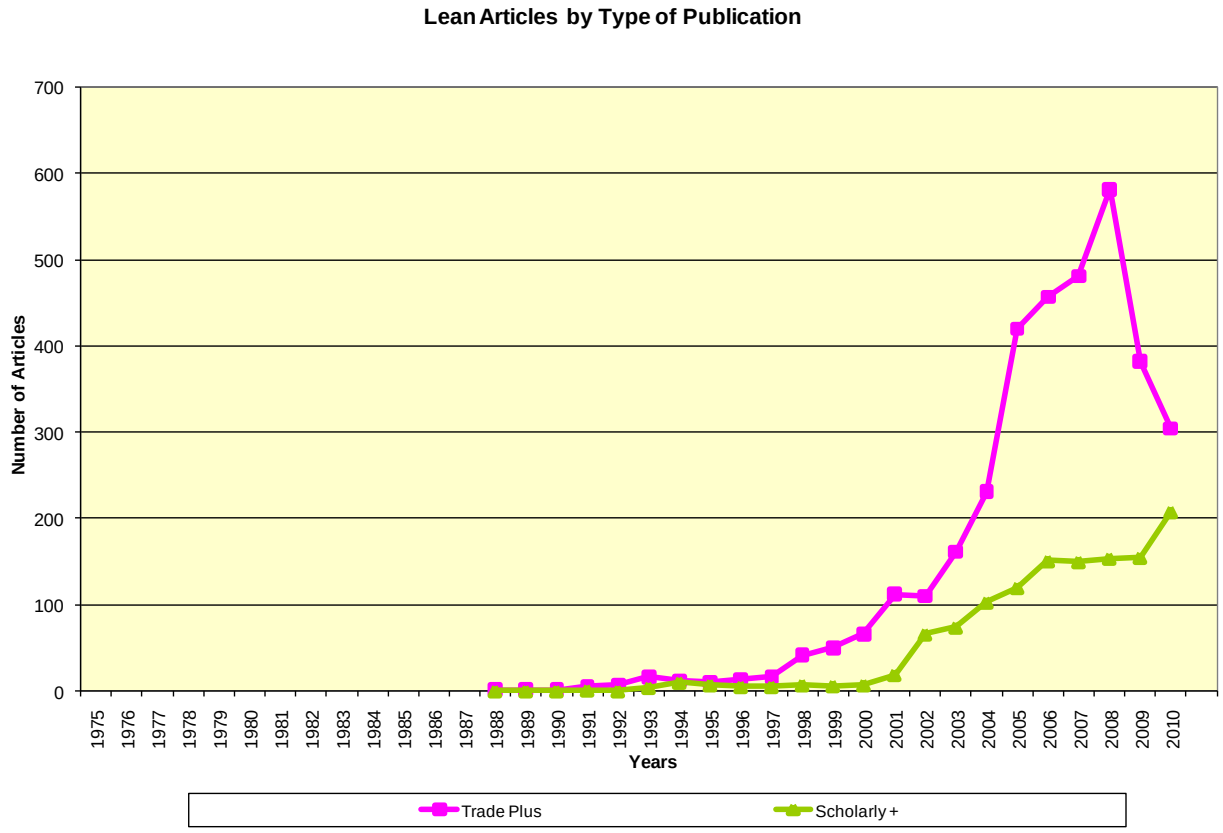

Figure 2. Trade versus Scholarly Articles for Lean Manufacturing

The End of the Life Cycle

Since management improvement programs follow a life cycle, some of them will eventually go into decline. What happens at the end of their life cycles? Some programs with a short life cycle quickly disappear into oblivion. Some programs fade away because newer programs that are similar, but more up to date, replace them. For example, MRP (materials requirements planning) was replaced by MRP II and, more recently, by enterprise resource planning (ERP). In a similar vein, many programs morph into a new program, such as JIT being succeeded by lean management or TQM by Six Sigma.

Many companies assimilate management programs into their normal day-to-day practices. While they may not have a definite identity as originating in a specific program, basic elements of the program remain as standard practice. For example, some companies may introduce self-directed work teams as part of a TQM program and continue their use of teams even after discontinuing the formal TQM program.

Implications of Program Life Cycles for Management

What are the implications of knowing about management improvement program life cycles? After all, life cycles are interesting, and certainly good to know about when you are discussing something like a product life cycle. Marketing managers must be astutely aware of where a product is in the life cycle

because of the need to constantly introduce new products at the right time. However, being aware of management improvement program life cycles is different because as a manager, you are adopting a program into your organization, not producing a product for sale to an outside consumer. Nonetheless, there are several reasons to be aware of where an improvement program is in its life cycle.

1. **Programs that are early in the life cycle have not been completely tested yet**.
   In tracking articles about management improvement programs, we found that when the program is relatively new, it is still a novelty on the market. Articles in trade publications tend to be positive about the merits of the program. At this stage, you should view the program optimistically, but with caution, remembering that because the program is new, all of the problems have not been worked out yet.

2. **Programs that are further into their life cycle have gone through more application and testing, and hence, have gained more credibility in terms of value added to the industry.**
   Programs that have been around for several years have gone through a number of iterations of testing by various companies. As a result, these programs are more "seasoned" in terms of their ability to benefit a potential adopting organization. At this stage in the life cycle, articles may start to appear in academic journals, in addition to trade journals. In other words, there is a certain lag effect that occurs – trade journals and the popular press publish these programs first, followed by more scholarly/academic journals next (Ryan & Hurley, 2004). This distinction is important to note when one recognizes that the role of academic journals is "to disseminate scholarly knowledge" (Amason, 2005: 157). This statement upholds the traditional view of academic research, to lead the market with new ideas on how to run effective organizations. Within the context of management improvement programs, this translates into offering a critical evaluation of the true merits of these programs. An analysis of the strengths and weaknesses, as well as the application limits, is part of this scholarly evaluation. For management, information is more readily available to evaluate the merits of the program at this stage than at the earlier stages.

3. **Programs near the end of their life cycle may be replaced by new programs that are more contemporary and relevant.**
   Just as lean production succeeded JIT, and Six Sigma followed TQM, most successful programs eventually spawn new programs that are designed to correct developing problems or capture opportunities not addressed in the original program. For management, it is important to make the decision between choosing an older program, one that may not be around much longer but has proven reliable, versus a newer program that may not have been tested as much, but could potentially offer more than the original program. This is the same decision managers often face when deciding upon versions of software.

Understanding the life cycle of an improvement program helps management in their evaluation and selection of the right program. Selecting a program that has not been tested or applied much in industry could yield a costly and ineffective decision if the program fails. On the other hand, selecting a proven program near the end of its lifecycle could yield a short duration of the desired results, when selecting an upgrade to the program would have been more effective.

INTRODUCTION TO INDIVIDUAL MANAGEMENT PROGRAMS

In this section, we provide an overview of approximately 50 management programs. In order to make the discussion more relevant, we have grouped the programs into ten categories:

- Planning and control
- Execution
- Cost and waste reduction
- Quality improvement

- Response time reduction
- Flexibility enhancement
- Performance measurement
- IT and Intercompany Communications
- Integration
- Management

While other classifications could have been used, we believe that the ones listed above will adequately differentiate among the programs.

Planning and Control Programs

Planning and control programs are used to plan production and service operations. They usually begin with a demand forecast and translate that into production, inventory and resources plans.

The programs described in this section – MRP, MRPII and ERP – were developed to plan the production, or purchasing, requirement for complex assembled products, such as appliances and automobiles. They incorporated the concepts of independent and dependent demand. Independent demand refers to finished products, such as an automobile, and dependent demand refers to those components in an automobile, such as engines and wheels.

Materials requirements planning (MRP) was developed first. It could determine quantities and time requirements for products, but did not provide a way to monitor progress in achieving the plan. Its plans assumed infinite capacity – it ignored capacity requirements – and had other limiting constraints.

Manufacturing resources requirements (MRP II) attempted to extend the scope of MRP beyond the shop floor to link with marketing forecast and accounting cost systems. This was progress, but MRP II still used infinite capacity planning and had to be supplemented with special software programs to develop more realistic production schedules.

Enterprise resources planning (ERP) systems were designed to be even broader and included more integrated links with a number of separate modules, including not only marketing and finance, but also engineering and human resources. While it achieved greater integration of functions, it still did not include, in most cases, finite capacity planning.

Planning programs were a major step forward in developing software that would make it possible to plan production and resource requirements faster and for more complex manufacturing environments. However, they needed to be supplemented with systems that could provide more realistic production schedules, or execution systems.

Planning systems were primarily concerned with processing data and did not provide a way to activate process equipment, a task for the execution systems.

Execution Programs

The planning programs could develop when and how much was needed, both at the macro and micro levels. However, they needed additional programs to decide how best to schedule the work through procurement, manufacturing and distribution processes. These are classified as execution systems and include computer integrated manufacturing (CIM), manufacturing execution systems (MES), warehouse management systems (WMS) and advanced planning and scheduling (APS).

CIM was developed in the 1970s but suffered from a lack of clear identity. Its scope ranges from a localized view, such as in flexible manufacturing systems (FMS) to being promoted as even broader than ERP systems. We present it as being a system for activating individual pieces of equipment, such as the use of numeric control (NC) capability. It also included the linking of individual pieces of equipment into automatic assembly lines or other forms of automated processing.

Manufacturing execution systems (MES) represented an approach to how best to link machines and process steps with information collection and control devices. It includes feedback on operations and introduces controllers that can adjust equipment to keep it running as intended. As an oversimplification, an MES system digitizes and collects data about actual operations and sends this data to the ERP system, where it is stored and made available to other systems.

Advanced planning and scheduling (APS) systems were designed to overcome the infinite capacity problem generated within the planning systems. It used algorithms and mathematical programming to develop optimized schedules that met the requirements generated by the planning systems. An APS system obtains data from ERP systems for use in the planning process.

Warehouse management systems (WMS) focused on warehouse operations, as contrasted with the manufacturing area, and used computers and automated transport capabilities to increase the automation within warehouse operations.

We have also included the Theory of Constraints as an execution system because of its pioneering work in introducing the "drum-buffer-rope" approach to dealing with bottleneck operations.

Cost and Waste Reduction Programs

While most management programs claim that cost reduction is a benefit of that program, most programs also dislike being labeled as "just" a cost reduction program. Consequently, we agree that the programs included in this section provide benefits beyond cost reduction. However, they also represent programs that make cost reduction a major emphasis. If waste can be aligned with costs, then these programs can be said to have cost and waste reduction as their primary focus.

Just-in-Time (JIT) originated with the Toyota organization as a way to reduce inventories and to streamline their production and distribution processes. This concept was known as stockless production, zero inventories and The Toyota Production System before the JIT label became universally accepted. It was designed for repetitive industries but found some acceptance in related industries.

Lean manufacturing was a concept introduced in the late 1980s, with its origin in the global automotive industries. It incorporated many of the concepts found in JIT but its name seems to capture more accurately its objective of identifying the desired flow of materials and smoothing that flow by removing obstacles to the flow.

Business process reengineering (BPR), introduced in the 1980s, proposed radical changes in processes to achieve dramatic improvements. It proposed that incremental improvements were inadequate and that companies should take a "clean slate" approach to redesigning the best process available. BPR had a few notable successes but faltered because of its disruptive effect, especially in the area of human resource management.

Value analysis was a concept introduced as far back as the 1950s, when it was endorsed by the U. S. military. It never materialized as a popular program; however, in recent years, it is reappearing. Its basic

premise is that the basic value of a product or service should be identified and that knowledge used in design of future products and services.

Quality Improvement Programs

Quality improvement has become a critical success factor for most organizations, whether manufacturing, service or nonprofit. The quality improvement movement started with statistical process control techniques developed at Western Electric in the 1920s, spearheaded by Walter Shewhart. Two men who later became recognized internationally as quality gurus were Joseph J. Juran and W. Edward Deming. They developed their basic understanding of the quality movement while at Western Electric, working with Shewhart.

Statistical process control (SPC) focused on improving individual operations. A related topic was lot acceptance sampling, in which individual lots of incoming materials could be sample tested to see whether it should be accepted or rejected.

As the quality movement began to catch on, one of the companies that endorsed its use was General Electric. While at GE, Arnold Fieganbaum wrote a book called *Total Quality Control*, describing an approach that spanned from product development through manufacturing to final product distribution. This was one of the early efforts to present quality improvement as an integrated management program.

Total Quality Management (TQM) emerged in the mid-1980s as foreign competition, especially from Japan in the automotive industry, realized that quality was an important issue in manufacturing. TQM was presented as an all-encompassing program that included both statistical and behavioral considerations. The use of teams and employee empowerment were an integral part of TQM. TQM was highly promoted as useful to not only manufacturing but also service companies. While some of the results were positive, a number of organizations found that their TQM programs were only moderately successful, if at all.

The disappointing results from many TQM programs gave rise to a more disciplined approach known as Six Sigma. Motorola introduced the concept in the late 1980s and Jack Welch at General Electric soon endorsed it. While Six Sigma incorporated many of the concepts from TQM, it packaged them differently and insisted on more formal training, closer monitoring of actions and results, thoroughly prepared team leaders and top management commitment. The more structured approach seems to be working. Six Sigma programs can be found in both manufacturing and service organizations. It is still in the growth phase of its life cycle.

Genichi Taguchi, a Japanese scientist, originated the "quality loss function," a concept that broadened the scope of quality costs to society. While there are direct costs of poor quality, Taguchi extended this cost to include the negative effects on society in general. While his ideas never resulted in a specific management program of note, his concept is prized, especially in the academic textbooks.

Response Time Reduction Programs

During the latter half of the twentieth century, lower costs and higher quality became basic objectives for most companies. By the last quarter of the century, it became apparent that reduced response times were becoming almost as important. Accordingly, companies began to design programs specifically aimed at reducing response times.

The Quick Response System (QRS) was developed in the textile and clothing industries. It was designed to offer a way to quickly replenish products that sold in the early days of a season. In the past, retailers usually had to order enough merchandise to last the entire season. As a result, they sold out of the fast moving items and were forced to mark down or otherwise dispose of slow moving items. The QRS offered a way to order enough to get the season started and then to reorder those items that sold best.

The Efficient Consumer Response (ECR) was an extension of the QRS to the grocery industry. As the number of products increased, it became unrealistic to order the same quantities of each item and ECR was an attempt to reduce that need. It also served to help companies "try out" new products with minimal quantities and then to reorder those that proved to be successful.

Vendor Managed Inventory (VMI) was an extension of the rack jobber or service merchandise programs that have been around for at least the last five decades. VMI charges the supplier with the responsibility for managing their customer's inventory. As point-of-sale (POS) terminals and electronic communication systems become more effective, it makes it easier for vendors to have insight into the flow of their goods through their customers.

Collaborative Planning, Forecasting and Replenishment (CPFR) brings the previous three programs to a new level by introducing the need for collaboration among entities along the supply chain. One of the key areas for collaboration is in preparing demand forecasts. Companies not only share demand information but also jointly agree to the demand forecast. This added knowledge provides the suppliers with a greater insight into the potential demand, especially as it relates to events planned by their customers, such as sales promotions.

Flexibility Enhancement Programs

After cost, quality and response time, flexibility appears to be emerging as a fourth critical success factor for businesses. While the first three can be defined and measured to a reasonable level, flexibility remains a somewhat ambiguous term.

If we were to design a continuum with standard mass production on the left and mass customization on the right, flexible operations would be somewhere in the middle. Flexibility, according to the APICS Dictionary, is the capability to deal with a number of factors, including product mix, design changeover, product modifications, volume changes, rerouting requirements and material changes. The implication is that the existing processes can be adapted to handle the required changes, whether planned or inadvertent.

Agile processes, or agility, imply a capability to move smoothly among a wide variety of product choices in a systematic way to provide what the customers want, and to do this within the constraints of cost, quality, and response time requirements. The implication is that the processes have been designed to handle the variety as a regular part of making relatively standard products.

Mass customization carries agility to a higher level by requiring that the processes be designed to not only produce a wide variety of standard products but also customize those standard products to meet the needs of individual customers. Mass customization requires the highest level of flexibility and agility.

Flexibility enhancement programs focus on using the modularity concept in both products and processes. Modular products make it possible to move from a make-to-stock (MTS) orientation to an assemble-to-order (ATO) or even a make-to-order (MTO) position. Modular processes involve using a combination of machines and operators to achieve the best balance between the two resources – enough automation to achieve speed and efficiency, and enough operator input to achieve flexibility.

Performance Measurement Programs

Performance measurement has been an area of interest for management for centuries. While there was interest, it is difficult to identify a specific program that focused on performance measurement. In general, the finance, or accounting, function was generally considered responsible for developing ways to measure the performance of operations and other functions within an organization.

Some of the early attempts at program development included management by objectives (MBO) and standard costing. These, and other, programs suffered because of the difficulty in relating the results with the financial accounting system, which became the official barometer of performance, especially as public companies grew and were required to present audited financial statements.

Activity-based-costing (ABC) was developed to bridge the gap between micro performance measurement and a macro link with the financial accounting system. It focused heavily on devising a better way of allocating overhead expenses to products and services costs. It did not distort the financial accounting system; it supplemented it with greater detail. As a result, it gained favor. However, it had a major drawback in that it required a great deal more detail and complexity in the reporting and assignment of expense categories. While this examination of the detail provided opportunities to eliminate, simplify and combine, ABC programs faltered in many organizations because of the increased cost and complexity.

Activity-based management (ABM) extended the role of ABC to doing something with the information developed in the ABC program. While it offered a logical approach, it was difficult to distinguish between the concepts of ABC and ABM.

The Balanced Scorecard (BCS) extended ABC and ABM into the strategic area. It included not only the financial perspective but also the customer perspective, the business process perspective, and the innovation and learning perspective. This program appears to be gathering support but it is difficult to know how widespread it is used.

IT and Electronic Communications Systems

Advances in information technology (IT) are providing the connectivity required within and between organizations. Intra- and inter-organizational communications systems are making coordination and cooperation among supply chain members a reality.

Electronic data interchange (EDI) has been a viable technology for at least three decades. However, its initial investment costs are high and only a limited number of companies considered it an attractive alternative. Those that used it found it to be reliable and efficient. While third party providers extended the scope, traditional EDI did not achieve mass use.

The advent of the internet began to open up the attractiveness of electronic communications to all companies. Almost all organizations have some access to the internet and there are a number of ways to use it to communicate with other organizations. While the cost hurdle has been lowered, the questions of confidentiality and information security are still troublesome considerations. Companies will likely find a way through the maze of options to reach a satisfactory way of communicating electronically with their suppliers and customers.

Electronic communications has opened up two major ways of doing business. Business-to-business (B2B) involves one business selling products or services to another business. Business-to-consumer

(B2C) involves a business selling products or services directly to an individual consumer. While B2C is more widely publicized, B2B provides a greater volume of business.

Electronic communications has great future possibilities. Teleconferences are just beginning to become an accepted medium of communication; they offer great opportunities for reducing travel costs and promoting more collaborative relationships. Health care is another area that may benefit from electronic communication systems, from using RFID tags to reduce medication errors to long-range diagnostics.

Integration Programs

Integration programs more closely link one entity with another, such as in supply chain design. The concept of core competencies suggests that a company should concentrate its resources on doing those things it does best and outsource the other needed processes and services. In contrast to vertical integration, in which a company owns all of the necessary activities, the current view is that a company must develop business relationships with a number of other organizations to achieve comparable results at a much lower investment cost.

One program that promotes integration among functions within a company is Quality Function Deployment (QFD). The unfortunate choice of names is misleading. While QFD does consider quality, its foremost purpose is to design a product or service that considers customer needs or wants, internal process capabilities and competitor strengths and weaknesses. This technique has more potential than is currently being realized.

Sales and operations planning (S&OP) is a program that was first developed at least three decades ago but had difficulty in being accepted, perhaps because they was not sufficient recognition of the need for integrating the marketing and operations functions. In recent years, S&OP has experienced a new level of interest and is now a basic part of achieving collaboration, both within a company and with external trading partners.

Supply chain management (SCM) is, of course, the ultimate integrating program. It envisions the linking of a series of organizations to achieve a smooth flow of goods and services from the raw material state to the finished goods state. While almost every organization is conscious of the need for effective supply chains, most are still in the early stages of successful implementation.

Customer relationship management (CRM) is an extension of the supply chain toward the customer. It is a more formal approach to determining customer needs and designing approaches to satisfy those needs.

Supplier relationship management (SRM) is an extension of the supply chain back toward the supplier. As is CRM, SRM is a more formal approach to determining how best to deal with suppliers to achieve the desired results.

Building relationships is the core of integrating functions. This requires an extension of coordination and cooperation into collaboration. Collaboration requires trust, and trust is an elusive element in most of today's business relationships. Building trust is one of the challenges for the future.

Management Programs

Programs in this category are more difficult to track because some of them do not have an acronym to accompany their general description. Consequently, the accuracy of the number of articles may be a bit more tenuous. There are also variations of these programs. The programs included in our study include

Management by Objectives (MBO), Strategic Planning, Risk Management, Knowledge Transfer Systems (KTS), Sustainability, and Chaos Theory.

MBO was a concept first introduced in the 1950s by Peter Drucker. While the objectives are praiseworthy – to establish measureable objectives for individuals and then measure progress against the objectives – the implementation proved to be difficult. In theory, the objectives of each manager would fit within the framework of the total corporate objectives, a monumental undertaking. In practice, the situations within an organization were continually changing, making it impossible to use the original objectives in any meaningful way. Articles go back beyond 1975, our starting year, but have tailed off to practically nothing in recent years.

Strategic planning has also had a long, and sometimes rocky, history. While there have been a steady stream of articles, this program has never had a surge of interest. Companies found it difficult to prepare strategic plans that could be used in ongoing operations. Writers have also noted a distinction between strategic planning – a formal planning process, spearheaded by planning departments – and strategic management – a more informal process, sometimes internally initiated and sometimes a reaction to external forces. While the need to be "strategic" is accepted, implementation of the concept varies, both in content and level of achievement.

Risk management has also been written about for a number of years; however, the popularity of the topic has mushroomed in the past few years. The primary cause of this increased interest is undoubtedly the increase in offshore outsourcing. As supply chains grow longer and more complex, and as companies implement lean manufacturing techniques that increase the need for low variation in their supply chains, the risk increase. Risk management requires the ability to anticipate and plan mitigation efforts; it also requires an organization to be agile enough to react to unanticipated disruptions.

Knowledge transfer systems (KTS) have become a formal type of program in the past couple of decades, again perhaps the result of the trend from vertical integration to loosely coupled supply chains. Knowledge has become a valuable asset, and the need to preserve and protect it has emerged as a strategic objective in most organizations.

Sustainability issues have been building for a number of years and appear to be nearing a tipping point, where there will be broader acceptance and implementation of initiatives. At present, programs appear under a number of banners – "green," "cradle to grave," "cradle to cradle," "triple bottom line," and others. While there are major differences between the major stakeholders – society, special interest groups, business and government – there is a growing acceptance of the need to act, not just talk.

Complexity, and chaos theory, has been studied since the 1970s, with the work of Lorenz in meteorology. Its application in business has been primarily metaphorical, not based on scientific principles. However, the idea is intriguing and will no doubt be studied in more depth during the next few years, with an eye to more carefully packaging it as a management program.

CONCLUSIONS

This has been a quick trip through the maze of management programs and their acronyms. We conclude with these additional observations about the value and potential for them.

- Management programs have demonstrated lasting value when appropriately applied and implemented.

- They are a convenient way to package improvement initiatives that might otherwise be lost in the bustle of everyday business.
- They consolidate the body of knowledge for a given program and usually show the links with similar programs.
- Management programs increase the competitiveness of a company and often an industry, as multiple companies use the program to improve.
- Consultants and educators are available to help organizations with their analysis and use of programs, eliminating the need to "reinvent the wheel" every time.

A caveat to all who consider adopting a new management program. They can be oversold, inappropriately fitted to the problem, and inadequately implemented. However, they can be the difference between success and failure for many organizations.

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