3

Management Theory and Concepts

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3.1 Introduction

The objective of this chapter is to layout the evolution of the EM theory in order to better define the current thinking about EM. The end result may be a more standardized approach as to what is taught in EM academic programs and what is practiced by EM professionals in this country and around the world.

3.2 Historical Perspective

The logical beginning place for EM theory is with the Industrial Revolution. Prior to the Industrial Revolution, manufacturing was done by craftsmen, making one item at a time. Practically everything was made to order. There is some mention of enterprising craftsmen hiring workers to do the simpler parts of the total tasks and the craftsmen performed the skilled work in order to increase the number of items produced. Transportation was so primitive that it was difficult to secure raw materials consistently and it was equally difficult to identify a sufficient number of customers to make such efforts worthwhile. The invention of the steam engine did much to change this. The steam engine spawned transportation systems not dreamed of previously. In addition, the steam engine provided the potential for powering manufacturing industries. This fact was not lost on a myriad of inventors who used the steam engine to develop ways of manufacturing quality goods that previously were made only by craftsmen. James Watt invented the steam engine and formed a partnership with Matthew Boulton to manufacture and sell them. "In 1776, Watt's first engine was sold to John Wilkinson for use in his iron works. Not knowing what price to charge, an agreement was made that the steam engine would be 'rated' at the equivalent of how many horses could do the same amount of work: hence the derivation of 'horsepower' for mechanical engines" (Wren, 1979).

Another inventor, Richard Arkwright, is credited as being first to develop the concept of the factory. He organized all of the equipment required to make cotton cloth in one building. This model of efficiency was copied and improved on for many years. But it takes more than equipment and buildings to make products. It takes workers, preferably skilled workers. There was an initial effort made to recruit the skilled craftsmen to work in factories. There were not enough of them so farmers were also recruited. These two groups proved to be difficult to deal with. They were independent by nature and resented the factories which, in some cases, caused them to lose their former professions, and in every case attempted to regiment them and tell them what to do all of the time. As a result, there are many incidents recorded where factory equipment was destroyed by these discontented workers. These workers came to be known as "Luddites," named after a youth in Ludlam had smashed his knitting frame when his father had been too harsh with him (Wren, 1979).

Because of the shortage of skilled labor, the independence of craftsmen and farmers and the problems with them destroying machinery, factory owners turned to another labor source: women and children. It has been estimated that by the year 1800, 75 percent of the factory workforce consisted of women and children. Management talent was just as scarce as skilled labor. There was very little known about how to successfully run a factory. Abuses of women and children were widespread. Fourteen-hour workdays were common. The English Parliament investigated and attempted to establish a 10-hour workday for children. This effort went on for 20 years but was never passed. Yet, during this same time Robert Owen started and operated the New Lanark factory in Lanark, Scotland (George, 1968). Children's work hours were limited to 10 and ¾ hours per day. Both school time and teachers were provided by the company, and workers were provided with homes at moderate cost. Company meetings and outings were held on a regular basis. And most importantly, the company was very profitable. After the invention of the steam engine, the second most significant development of the Industrial Revolution was the adjustment the early factory owners made to accommodate the large proportion of unskilled labor. They broke the complex tasks down into a myriad of simple tasks. They developed "division of labor." Division of labor, considered the first EM theory, was widely written about during this time as a necessary principle for success in manufacturing. All of the decisions were made at the top of the organization by management. Workers only had to concentrate on the small task in front of them. Even so, some factories experienced problems with workers not paying attention to their work. Incentive plans were instituted so that workers were paid for only the good pieces they produced.

Frenchman Henri Fayol (1949) is generally credited with being the first to develop general management principles. Fayol published his management principles in 1916 but they were not translated into English until 1949. He was an engineer who rose to the position of general manager in a mining firm. Fayol made two significant contributions to management theory. He was the first to propose management principles and he was the first to define elements of management. His fourteen principles include:

1. Division of work
2. Authority and responsibility (relationship)
3. Discipline
4. Unity of command
5. Unity of direction
6. Subordination of individual to general interest
7. Remuneration (fairness of)
8. Centralization (degree of appropriateness)
9. Scalar chain (of command)
10. Order
11. Equity (loyalty and fairness)
12. Stability of tenure (unnecessary turnover)
13. Initiative (motivation of subordinates)
14. Espirit de corps

Fayol's elements of management are: planning, organizing, commanding, coordinating, and controlling. These are considered to be fundamental concepts that are still being taught ninety years after they were first published.

3.3 Scientific Management

Frederick W. Taylor was a contemporary of Fayol. While Fayol's background was in mining, Taylor's was in processing (steel) and construction. The next major development in management theory was Frederick W. Taylor's Scientific Management. This is presented as the third major EM theory. Taylor's (1911) methodology is contained in his four principles:

1. Develop a large collection of knowledge about the process under study. Use this knowledge to determine the one best way to perform the work.
2. Scientifically select workers who are most able to perform the work by the specified method.
3. Train the workers to do the work using the "one best way." Provide incentives for using the correct method.
4. Let management and workers collaborate on decisions so that the unique knowledge that each has can be used toward the solution of organizational problems.

It can be seen that division of labor is implied in these four principles. There is an overriding assumption that management divides the work and makes decisions affecting the way work is to be done. Taylor believed: that if any task is studied sufficiently, management can determine the one best way for doing anything and can optimize productivity. He further believed that the variation introduced by the workers could be reduced to insignificance through training and incentives. Workers and machines were seen as only slightly different.

3.4 The Bureaucracy

The next major theory to be discussed was developed by the German economist Max Weber. Weber (1947) became sensitive to the abuses of both bad and unscrupulous managers. He sought to develop a management system which would protect the worker while at the same time require managers to use accepted management practices. Weber was one of the first to make a clear distinction between managers and owners. He saw owners as those who routinely hired without regard to abilities and qualifications. They were also likely to promote workers to higher level positions similarly. The principles Weber chose to accomplish his goals were as follows (1947):

1. A well-defined hierarchy of authority with centralized decision making (by top management)
2. A clear division of work (labor)
3. Rational program of personnel administration
4. Rules and regulations as to how each job was to be done and the acceptable rate of production
5. Written records
6. A staff of experts to assist managers in solving complex problems

According to Weber's concept, the manager represented authority. The manager was at the top of the organizational pyramid and made decisions based on "his sphere of competence." "Rules and regulations" pre-made as many decisions as possible, thus ensuring fair treatment of employees.

The purpose of the "Rational program of personnel administration" was to "pre-make" decisions so that every employee is treated exactly like all others. Job descriptions and production quotas would ensure that only reasonable work would be expected of employees. Complex problems were to be solved by the manager and his staff of experts, not by the workers. Weber felt that not only would workers be protected by such a system but that the organization would be more productive also. Notice that here, too, we see the familiar "division of labor."

Division of labor helped to train managers for each division of the process. This proliferation of managers adds levels to the organization. The many levels of the organization also contribute to the primary attribute of this system control. So, multi-levels of structure and a small span of control are characteristic of Weber's design. Weber failed to see that his system would only function adequately in a stable environment where neither competitors nor technology were changing rapidly. If either of these were to begin to change, the organization bound by rules and a strict chain of command could not adapt to the changing environment. Weber's system was designed to control, to prevent abuses. It was not designed to innovate, to develop new products or processes. It was called by a familiar name—it is the *bureaucracy* and it created a set of problems never envisioned by Weber.

A Critique: The problem is that most industries in the U.S. use some version of the bureaucratic management principles just discussed. Chris Argyris (1957) wrote perhaps the most accurate critique of these management principles. First, he researched the common characteristics of personality development. They are as follows:

1. Man develops from a passive infant to an increasingly active adult
2. Goes from a state of dependence to independence
3. Changes from simple behavior to complex with maturity
4. From shallow interests, man develops deep commitments
5. Goes from short time frames to long time frames—more affected by the past than the future
6. Develops from family subordinate to peer or leader
7. Goes from a lack of awareness of self to the development of self control

Argyris (1957) further identified four common classical organization concepts and compares the result of using them with the traits of normal personality development listed above.

- Division of labor—The individual sells skills rather than total abilities
- Chain of command—This tends to make individuals dependent, passive
- Unity of direction—This is leader oriented, not a function of workers
- Span of control (usually four to eight)—Adds levels to the organization, thus increases dependence

Argyris hypothesized three results of using classical organization concepts:

1. There is a lack of congruency between normal personality development and classical organization concepts.
2. This lack of congruency generates frustration, short-term perspective and conflict.
3. The result will be inter-subordinate hostility, rivalries, and a focus on parts of the organization rather than the whole.

3.5 Behavioral Approaches

The first years of the twentieth century saw a multitude of management concepts developed. In addition to Fayol's Principles' Scientific Management and the bureaucracy, Frank and Lillian Gilbreath developed methods analysis and Henry Gantt developed the Gantt chart. The idea that management practice could improve productivity had many organizations actively searching for additional management concepts that would give their organizations a competitive advantage. Western Electric conducted a wide range of experiments with management practice at its Hawthorne works. They experimented with lighting, work breaks, incentive systems, organization communication and other concepts. The general conclusion reached was that the attitude of workers had much to do with organization productivity. They did not reach firm conclusions on how to develop those positive attitudes. Theories on workforce motivation required another thirty-five years to develop.

If there is any semblance of truth in Argyris' work, care must be taken as to what is taught in EM programs as acceptable practice. After World War II, many behavioral theories were developed. The ill-fated "human relations" movement spawned much research that has proved to be beneficial but not the total answer. Maslow (1943) theorized the five levels of the "hierarchy of human needs." These began with the physiological level, followed by the security needs level, membership, esteem and self actualization. According to Maslow, workers are motivated to achieve the next level in the hierarchy. The organization must recognize this and initiate programs to assist this process. The organization benefits if its members are advancing up the hierarchy.

Douglas McGregor (1957) observed managers making assumptions about workers in their decisions. He labeled these assumptions about workers as Theory X—workers must be coerced to work, as they are lazy and want security above all. Theory Y assumes that workers will exercise self-control to achieve organizational objectives to which they are committed, seek responsibility, and are innovative in solving organizational problems. McGregor observed that management made these assumptions about its workers and made decisions based on the assumptions. If the assumptions were in error, workers developed resentment that management never understood.

Frederick Herzberg (1968) did research on job satisfaction and found one set of factors that primarily dissatisfied workers and another set that act as satisfiers. The dissatisfiers we found to be: working conditions, company policies, relations with the supervisor, relations with peers, and pay. The satisfiers were found to be: recognition, achievement, possibility of growth, advancement, responsibility, and the job itself.

Herzberg (1968) observed that management frequently attempts to use hygienes to motivate the workforce but an increase in hygienes only increased the anticipation of further increases. Costs rose but motivation and productivity did not. The motivators were more difficult for management to apply but were not as expensive as hygienes. He further observed that hygienes must be maintained at an appropriate level to prevent dissatisfaction but they could not motivate.

3.6 Quantitative Methods

The quantitative methods of management were developing at the same time as the qualitative concepts. George Dantzig published a description of the simplex method of linear programming in 1947. Other optimizing techniques soon followed. The operations research (OR) movement formed and grew fast in the 1950s and 60s. There was a general feeling of the time that as computers become faster, management will be able to solve most of its problems mathematically using a variety of OR concepts. The development of decision trees, game theory, dynamic programming, and chaos theory are examples of concepts that would enhance the ability of managers to make optimal decisions.

Engineering economy was first promoted within AT&T in the 1920s as a way to make better financial decisions. They developed the first textbook in the field and taught their managers and engineers in company sponsored classes. Engineering economy continued to evolve and became a course common to most industrial engineering curricula in the 1960s and is now a part of most EM programs. Engineering economy is a way of making economic decisions in terms of current currency valuations or taking time value of money for future resources into account.

Engineering economy combined with cost and managerial accounting provide managers with powerful tools to aid decision-making. The tendency for bureaucratic organizations with decision-making concentrated at the top, the overuse of quantitative decision-making without first-hand knowledge of organizational processes led to a term labeled as "the rational model" by Peters and Waterman in their book *In Search of Excellence* (1982). The "rational model" was associated with low productivity organizations. Even powerful management tools and concepts can be used to the disadvantage of an organization.

3.7 Summary

Hallmarks of classical management are: division of labor, unity of command, the development of a body of knowledge on all important tasks, there is one "best" way for doing a task, there are an assortment of quantitative methods to assist managers, and there are concepts to motivate workers to do the jobs that need to be done. There are probably more examples of poor management than good. How then do we choose the best management practices under a specific set of circumstances?

3.8 Attempts at Integration

How does the behavioral information relate to the overall management knowledge base? Koontz (1961) made an attempt to put much of this information into perspective. He formulated six "schools of management thought". Six schools are a bit unwieldy. They can easily be narrowed to three:

1. The Management Process School (including The Empirical School). The Management Process School describes management activities as planning, organizing, communication coordinating, and controlling. Focusing on these activities will improve the skills of the individual manager and that of the organization. Research by Mintzberg (1971) indicates that these activities do not adequately describe what a manager does in organizations he studied. The "management activities" do seem to be helpful in providing a conceptual framework to describe managerial activities. In other words, they form a good starting point in describing management.

   The Empirical School is promoted by the Harvard Business School. It uses case studies of actual situations to train and educate future managers and organizational leaders. Principles of management are formulated based on experiences either actual or resulting from studies of real situations. The case study approach allows students to learn from managers' successes and failures. Studies of cases allow students to begin forming their own "principles" of management.
2. The Behavioral School (including both individual and group processes).This school infers that management is getting people wanting to get the work done versus just expecting them to get the work done. Individual theories include the motivation research of Herzberg (Motivators and Hygienes), Maslow (Hierarchy of Human Needs), McGregor (Theory X and Theory Y), McClelland (The Urge to Achieve) and others.

   Achieving success through group or team processes has been developed by many, including Blake and Mouton (The Managerial Grid), Likert's "Four Systems", and Katzenbach and Smith (The Wisdom of Teams).
3. The Mathematical School (including all quantitative methods of solving management problems). One part of this school includes optimization concepts such as linear programming, decision probabilistic theory and then the question becomes one of balance between the concepts and their appropriate relationship to each other. The EM field is dominated by knowledge workers, professionals, and talented technical personnel. Classical management concepts (as Argyris pointed out) were developed for unskilled workers in an environment controlled by upper management.

Not included in the Schools of Management Thought is the impact of the organization structure. Burns and Stalker (1961) discovered that organizational success showed a relationship between the level of technology used and the type of structure employed. "Organic" structures were better adapted to organizations using moderate or high technology as a critical part of the enterprise. "Mechanistic" structures were used by organizations producing commodities with low technology processes. This 1961 study was done at a time when the use of low technology was a real option. Today, there are few organizations with

that luxury. The implication drawn is that the Human Behavior School is more important to most organizations, especially to those employing the highest levels of technology.

3.9 What Is Working?

The most important concept to recognize is that in a technology-driven organization, the most valuable asset is the collective knowledge and abilities of employees. If facilities are degraded or destroyed, they can be rebuilt, at a significant cost, but it can be done. If key employees leave, they take significant amounts of knowledge with them. This knowledge may be more difficult to replace than facilities as well as more costly. It would be worthwhile to examine the practices of successful medium- to high-tech organizations. Article after article has some combination of the following characteristics:

- Fayol and the Management Process School—Managers must be knowledgeable about the functions of management and how the processes work.
- Scientific Management—There is a body of knowledge of the processes required to do the primary work of the organization. Management must have this information and understand how to continually improve them. There are too many instances where company executives attempt to manage with financial data without process knowledge.
- Behavioral Approaches—Capabilities of knowledge-workers must be harnessed to achieve success in the era of the global economy. Willing, capable employees solve problems and create solutions and opportunities. Talented workers must participate in decisions affecting their work. Decisions must be made close to the situation by managers most familiar with the situations. Complex work is done in teams that coordinate tasks as a normal team function. Training is expected of all employees. The organizations cannot improve unless its members improve.
- Quantitative Approaches—Mathematical models and probabilistic approaches have much to offer in the solution of complex problems but they are not a substitute for a positive, productive culture.
- Organization Structure—Flat organization structure, fewer levels, relatively high employee to manager ratio is the norm. Management layers add control when flexibility is more valued. Imposed controls are counterproductive. Team developed goals are part of an effective control system.

There are literally dozens of "systems" being used by industries that use some combination of these factors. Some of the systems in current use are: Total Quality Management, Statistical Process Control, Just in Time Inventories, Team Management, Management by Objectives, etc. Other companies, not wanting to be left out, have attempted to use these systems with widely varying success. These systems in themselves are no panaceas.

Educators in EM should not be tempted to base programs in the classical theories that have limited use in the typical EM environment; nor should they be tempted to over-commit to the latest management "fads" such as TQM. If properly implemented, some of these "fads" may be productive. If they are used in an appropriate structure with the knowledge of behavioral theories, their probability of success goes up dramatically.

3.10 Conclusion

There is a place for both classical management concepts, new techniques in EM curricula. Additional information on the nature of the external and internal environments has much to do with the way each is to be applied. Other necessary ingredients for a successful management strategy are: an appropriate structure and a knowledge of behavioral theories that underlie the new techniques.

3.11 References

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