

Frederick Wilson Taylor's Scientific Management Theory

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Scientific management also called Taylorism is a theory of management that analyzes and synthesizes workflows, improving labour productivity. The core ideas of the theory were developed by F W Taylor in the 1880s and 1890s, and were first published in his monographs, "Shop Management" (1905) and "The Principles of Scientific Management" (1911).

By experimenting with different designs of shovel for use with different material, (from 'rice' coal to ore,) he was able to design shovels that would permit the worker to shovel for the whole day. In so doing, he reduced the number of people shoveling at the Bethlehem Steel Works from 500 to 140. This work, and his studies on the handling of pig iron, greatly contributed to the analysis of work design and gave rise to method study.

Taylor had identified serious flaws while observation of operations at factories. Some of them were:

- i) management lacked clear understanding of worker-management responsibilities;
- ii) lack of effective standards of work;
- iii) restricted output and failure to design jobs properly;
- iv) unscientific decisions by management;
- v) lack of proper studies about division of work among departments¹

The piece rate system on production management suggested by Taylor in shop management, and later, in 1909, he published the book for which he is best known titled 'Principles of Scientific Management'. This book features Taylor's work was stop-watch timing as the basis of observations. He started to break the timings down into elements and it was he who coined the term 'time study'. Taylor's uncompromising attitude in developing and installing his ideas caused him much criticism. Scientific method, he advocated, could be applied to all problems and applied just as much to managers as workers. In his own words he explained: "The old fashioned dictator does not exist under Scientific Management. The man at the head of the business under Scientific Management is governed by rules and laws which have been

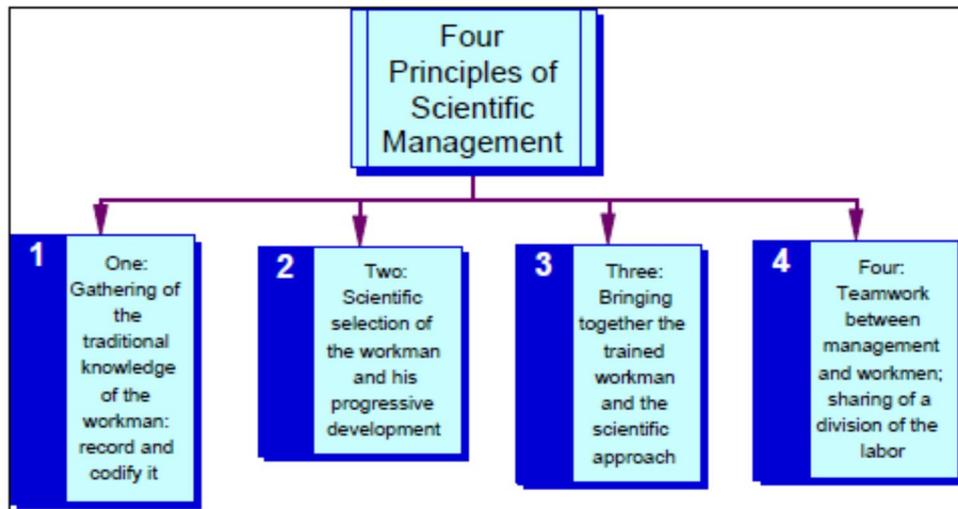
developed through hundreds of experiments just as much as the workman is, and the standards developed are equitable."

Taylor, a mechanical engineer by training, seeks to apply a positivistic, rational perspective to the inefficient work organization. Another "misfortune of industry" that impedes the progress of improving work is what Taylor refers to as the "soldiering" of the worker, which essentially means to make a show of work not necessarily doing one's best. The worker tries to balance the inner conflict he feels as a result of worry about job security versus expectations of productivity. Taylor says that the worker is not to blame for soldiering since, even if given the opportunity to work harder with greater output, the effect on the labour market is such that rate of pay is cut. What incentive does management have to pay a man more wages, even for greater output, when another man will accept less for, albeit, less output. Taylor believes that scientific management of work will alleviate the common work problems of inefficiency, slow rate of work, and decreased productivity. Logically, according to Taylor's view, soldiering would disappear as workers' productivity and security improved.

Taylor proposes four principles of the scientific management of work. He asserts that even though the average businessman believes that if workers were to go fast, thus increasing efficiency resulting in a money saving decrease of workforce, just the opposite would be true. Taylor believes increasing the efficiency of the workman scientifically would increase not only the opportunity for more work, but also the real wealth of the world, happiness, and all manner of worthwhile improvements in the life of the working person. For Taylor, increased workman output will result in improved quality of life.

The four objectives of management under scientific management were as follows:

The chart below illustrates Taylor's four principles of scientific management. Taylor is careful to assert that scientific management is no new set of theories that have been untried, a common misunderstanding. He says that the process of scientific management has been an evolution, and in each case the practice has preceded the theory. Further, scientific management is in practice in various industries: "Almost every type of industry in this country has scientific management working successfully." (Shafritz p.69) According to Taylor, the workman, on the average, in those industries where scientific management has been introduced, has turned out double the output and been the beneficiary of many improvements in working conditions.



Taylor's principles of scientific management derive from the positivistic paradigm. Positivism attempts to view the world rationally, free of subjective values, applying logic and reductionism to the process of determining cause and effect. Taylor's principles offer a method to gather information about the work process and the worker. The selection and training workers according to a scientific approach attempts to bring together the worker and the gathered, codified knowledge about work engendering some form of teamwork between the manager and the worker. Taylorism seeks a careful, objective approach to the way work is done based on a rational, apparently scientific approach.

Positivism applied to social theory perceives an organization as a rational bureaucracy with an appropriate hierarchy. "Organizations were seen as machines and people were viewed as appendages to those machines" (Carlson, 1996, p. 20). Both organizations and people need to be carefully controlled and monitored. This examination of the organization and the people in it is done through a rational, objective process that reduces the functioning of the organization to a logical, scientific method that can be replicated.

Positivism cannot be applied to all organizations. Efficiency, impersonal relationships, rationality and logic do not work well in social systems such as schools, which can be unpredictable requiring flexibility, negotiation, and interactivity (p.21).

According to Pfeffer in Shafritz and Ott (1996), the role of power in the decision making process of the rational/bureaucratic organization is centralized, and control is exercised over

goals so as to be consistent with rules of logic like Taylor's scientific principles. Decisions are made to increase efficiency in the Taylor model. Social systems such as schools often confront ambiguous situations requiring flexibility. There can be no "one best way." When confronted with decision-making in a complex social organization, political power can be expected to influence coalitions and cause conflicting interests, create disorder, cause disagreement, bargaining, and struggle for position. All aforementioned effects of political power in a complex social organization are unacceptable and unthinkable in the rational model represented by Taylor.

Bolman and Deal (1997) offer four frames with which to view organizations: structural, human resource, political, and symbolic. The structural frame has the greatest application to the Taylor model of work in an organization. Authority imposes the structure; experts scientifically analyze the context of work with no regard for unexpected change. By attending to a tightly organized structure of rational authority, managers leave no opportunity to consider the motivation of workers, the needs of healthy human beings, or the possibility of sharing responsibility for leadership. The other three frames presented by Bolman and Deal have little or no alignment with the Taylor model. The Taylor model does not take into consideration the needs of human beings regarding motivation and security. Political power is not distributed and remains with the expert authority that exercises control over the one best way for the worker to function in the work organization. Finally, the symbolic frame offers no alignment with the Taylor model; symbols in the Taylor model are neither strategically constructed nor recognized.

Frederick Taylor identified 4 principles of Scientific Management:

Develop a science of work- The science of work would be achieved by measuring output, and by performing detailed studies of time and human movement. With these studies, improvements could be made to the tools and workstation designs used by workers, which would increase effectiveness.

Scientific selection and training- Workers should be scientifically selected and trained. Frederick Taylor theorized that workers had different aptitudes, and that each worker should be fitted to the job. The task of management was therefore to select the workers fitting to the specific job, and also to scientifically train every worker in the most productive way of

performing the specific task. By doing this correctly, every worker would be selected and trained to achieve his/her utmost potential.

Educate workers and managers in the benefits of Scientific Management-Both workers and managers should be educated in understanding the benefits of scientific management.

Specialization and collaboration between workers and managers - Management should focus on developing, designing and supervising improved systems, whereas workers should concentrate on performing their manual duties. If everyone fulfils their respective role, no conflict would arise between management and workers, since the Scientific Management approach would find the best solution for all parties concerned.

Frederick Taylor strongly believed that the Scientific Management approach would solve conflicts between workers and managers, and that the approach had the potential of highly increasing the productivity of organizations.

However, many were not supporting his ideas. Several managers were threatened by the approach, since many supervisory jobs would be rendered useless if work was highly standardized. Likewise, workers were not pleased with the approach, since many jobs would be terminated when increasing productivity. Lastly, critics thought Scientific Management to be inhuman, since workers were believed to be reduced to bolts and nut in the industrial machine.

Despite all criticism, Taylorism had a huge impact on the industrialization process in the western world, and many companies have adopted Frederick Taylor's ideas over time. Taylorism can be seen performed in many modern companies, such as fast food restaurants, today, and is oftentimes highly reflected in the work processes of many modern service and manufacturing companies.

Contributions

The Scientific approach led to process improvement, it initiated the process of scientific study of time –motion and task to be performed and emphasized proper selection criteria for the job. This sort of task-oriented optimization of work tasks is nearly ubiquitous today in industry, and has made most industrial work menial, repetitive and tedious. Taylor's methods began from his observation that, in general, workers forced to perform repetitive tasks work at the

slowest rate that goes unpunished. This slow rate of work he opined, was based on the observation that, when paid the same amount, workers will tend to do the amount of work the slowest among them does: this reflects the idea that workers have a vested interest in their own well-being, and do not benefit from working above the defined rate of work when it will not increase their compensation. He therefore proposed that the work practice that had been developed in most work environments was crafted, intentionally or unintentionally, to be very inefficient in its execution. From this he posited that there was one best method for performing a particular task, and that if it were taught to workers, their productivity would go up.

His framework for organization was:

- clear delineation of authority and responsibility
- separation of planning from operations
- incentive schemes for workers
- management by exception
- task specialization

The assumptions underlying his work were:

- the presence of a capitalist system and a money economy, where companies in a free market have as their main objective the improvement of efficiency and the maximization of profit;
- the Protestant work ethic, that assumes people will work hard and behave rationally to maximize their own income, putting the perceived requirements of their organization before their own personal objectives and goals;
- that an increased size is desirable in order to obtain the advantages of the division of labor and specialization of tasks.

Taylor's impact has been enormous because he developed a concept of work design, work-measurement, production control and other functions, that completely changed the nature of industry. Before scientific management, such departments as work study, personnel, maintenance and quality control did not exist. What was more his methods proved to be very successful.

Criticism

According to Taylor, Scientific management in its essence primarily involves a complete mental revolution on the part of workers and management as to their duties, towards their fellow workers, and towards all of their daily problems. It demands the realization of the fact that their mutual interest is not antagonistic and mutual prosperity is possible through cooperation. The revolution was needed in mental attitudes of workers and managers. However applications of scientific management sometimes fail to account for *two inherent difficulties*:

- a) Individuals are different from each other: the most efficient way of working for one person may be inefficient for another;
- b) The economic interests of workers and management are rarely identical, so that both the measurement processes and the retraining required by Taylor's methods are frequently resented and sometimes sabotaged by the workforce.

Both difficulties were recognized by Taylor, but are generally not fully addressed by managers who only see the potential improvements to efficiency. Taylor believed that scientific management cannot work unless the worker benefits. In his view management should arrange the work in such a way that one is able to produce more and get paid more, by teaching and implementing more efficient procedures for producing a product.

Although Taylor did not overtly compare workers with machines, some of his critics use this metaphor to explain how his approach makes work more efficient by removing unnecessary or wasted effort. Some others believe that this approach ignores the complications introduced because workers are necessarily human. Some have argued that this discounting of worker personalities led to the rise of workers unrest.

It can also be said that the rise in labour unions led to a push on the part of industry to accelerate the process of mechanization. This shift in production to machines was clearly one of the goals of Taylorism, and can be considered a victory for his theories. However the theory of scientific management is perhaps not adaptive to the changing scenario, it stresses rigidly on the routinized works i.e. following set of rules and regulations, work procedures, and production centeredness etc.

The problems caused by Taylorism led to its replacement of the scientific theory by human relations school of management in 1930. Many still insist that human relations did not replace

Taylorism but that both approaches are rather complementary: Taylorism determining the actual organization of the work process and human relations helping to adapt the workers to the new procedures. However, Taylor's theories were clearly at the roots of a global revival in theories of scientific management in the last two decades of the 20th century, under name of 'corporate reengineering'. As such, Taylor's ideas can be seen as the root of a very influential series of developments in the workplace. Peter Drucker saw Frederick Taylor as the creator of knowledge management, as the aim of scientific management is to produce knowledge about how to improve work processes. His writings have predicted many of the major developments of the late twentieth century, including privatization and decentralization; the rise of Japan to economic world power; the decisive importance of marketing; and the emergence of the information society with its necessity of lifelong learning. In 1959, Drucker coined the term Knowledge worker and later in his life considered knowledge work productivity to be the next frontier of management.

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