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Principles of scientific management: Appropriateness for managing modern organisations.

“The best management is a true science, resting upon clearly defined laws, rules, and principles, as a foundation.”

In 1911, Frederick Winslow Taylor responded to President Theodore Roosevelt's challenge to the people of the United States: “The conservation of our national resources is only preliminary to the larger question of national efficiency”. Taylor's response took the form of his seminal work, *The Principles of Scientific Management*, in which he set forth principles for a revolutionary approach to increasing worker efficiency. The introductory quotation captures the essence of the precept underlying Taylor's concept of scientific management.

The fundamentals of Taylor's principles are as applicable today as they were almost a century ago, although the methods he recommended for applying the principles have been displaced to a great extent. Beginning with an introduction to Taylor's principles of scientific management, the appropriateness of his principles for managing modern organisations will be explored and concluding remarks supporting the thesis will be presented.

An Introduction to Taylor's Principles of Scientific Management

Taylor believed that managers of his time relied on the personal initiative of workers for achieving productivity, but that high levels of productivity expected from worker initiative were rarely attained. In contending that workers performed at levels beneath their true capacities, he professed four principles of scientific management to be followed by managers:

Develop a “science” for each element of a worker's job.

Scientifically select workers.

Scientifically train and develop workers.

Achieve “hearty” cooperation between workers and managers to ensure that work is conforming to the established scientific design, including providing planning and other support to workers to facilitate accomplishment of their jobs. Taylor cautioned that the principles of scientific management could not be applied piecemeal; rather, the combination of all principles was required. He summarised this combination as “science, not rule of thumb”; “harmony, not discord”; “cooperation, not individualism”; “maximum output, in place of restricted output”; and “development of each man to his greatest efficiency and prosperity”.

Taylor furnished a step-by-step approach for the scientific study of each element of a worker's job as required by his first principle: (1) identify ten to fifteen workers who are particularly well skilled in performing a job; (2) study the series of basic operations, motions, and tools that these workers use in performing the job; (3) measure, with a stop watch, the time each worker expends in performing each basic operation or motion then select the fastest method; (4) remove any unneeded or slow movements; and (5) establish a procedure using the optimal movements and tools. Taylor contended that the one resulting procedure, or standard, would be much more efficient than were the multiple different procedures previously used by the individual workers. Based on Taylor's third principle, he suggested that a “teacher”, typically the supervisor, would be taught the selected procedure first then the teacher would train the workers.

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The fourth principle, the support of workers by management, included the planning of work, a function that had been performed by the workers themselves in the past. Taylor was, by degree, an engineer. He also had experience as a worker and operating manager in a steel company. His observation was that supervisors used “rules of thumb” in managing their employees. He attributed this to supervisors having to acquire their management skills through “trial and error” rather than through formal training. Workers lacked training and set procedures for their work forcing them to rely on “rules of thumb” as well.

Taylor wanted to create a “mental revolution” among workers and supervisors. He called for “a complete revolution in the mental attitude and habits” of both managers and non-managers alike. The goal of Taylor’s scientific management approach was to obtain maximum worker output with minimum resource and energy inputs. The approach that he developed to achieve this goal through application of his four principles involved heavy specialisation and specification in jobs, allowing workers to learn their jobs quickly; allowing them to expend minimal mental effort because their tasks would consist of short cycles; and reducing costs because jobs would require lower levels of skills and, thus, would result in lower wage requirements. Reece and Brandt describe scientific management as the separation of a job into “isolated, specialized tasks” that are then assigned to specific workers. Taylor wrote:

“Perhaps the most prominent single element in modern scientific management is the task idea. The work of every workman is fully planned out by the management at least one day in advance, and each man receives in most cases complete written instructions, describing in detail the task which he is to accomplish, as well as the means to be used in doing the work.”

Taylor acknowledges that, even though work is “planned out” by managers, it typically takes the form of a joint effort by the manager and the worker as set forth in his fourth principle. He was careful to avoid the misunderstanding that he was trying to convert the worker into a “wooden man”. In his approach, Taylor provided for workers to make suggestions for improvements in engineered procedures and tools, requiring that managers carefully analyse these suggestions, adopt those that were superior as the new standards, and recognise the workers’ contributions. He felt that the end result would be happier, more prosperous, and more productive workers.

Appropriateness of Taylor’s Principles for Managing Modern Organisations

Despite Taylor’s high hopes, scientific management never solved many of the problems supervisors experienced in managing workers and their work. Drucker attributes this to inherent flaws including, first, the belief that breaking work into its simplest component motions meant that workers, as little more than machine tools, must perform the work as analysed and, second, the separation of planning the work from doing the work. The result, according to Drucker, was that workers gained “experience and habit” but sacrificed “knowledge and understanding”. This, he suggests, increases the resistance to change by workers. Waring writes that Lewin, one of the creators of sensitivity training, criticised scientific management for its “inconsistencies with human needs” as early as 1920. Nevertheless, until the 1950s, job design was typically defined by job specialisation.

It was criticisms raised by Drucker and others about Taylor’s approach that ultimately resulted in the development of alternatives to scientific management. Job enlargement and job enrichment were two alternatives that evolved. Job

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enlargement combines multiple tasks that were performed by different workers into one task giving each worker more variety. Job enrichment builds achievement, growth, and recognition opportunities into tasks. Mckenzie contends that today's performance management approach "developed out" of scientific management, suggesting that the former "displaced and overcoded" rather than "replaced" the latter.

Criticisms aside, noted management expert Peter Drucker writes that scientific management "may well be the most powerful as well as the most lasting contribution America has made to Western thought since the Federalist Papers". Cummings and Worley claim that scientific management is the "oldest and most prevalent approach to designing work". Taylor's principles underlie today's industrial engineering methods for designing jobs. These methods involve making work processes more efficient, identifying the best methods for accomplishing work, and smoothing work flows. Many modern management concepts such as reengineering, quality circles, and total quality management are constructed on the foundation that Taylor built. Breaking a process down into its elemental steps for study and improvement, for instance, reflects Taylor's principles. Worker and management training, a key area of management emphasis today, was an essential component of Taylor's principles. Mckenzie writes: "Today, the principles of [s]cientific [m]anagement can still be found in everything from the preparation of fast-food hamburgers to the manufacture of personal computers." A large percentage of modern organisational and operational practices can be traced to Taylor, according to Bassett. Megginson claims that Taylor's principles of scientific management "are still the precepts upon which the effective utilization of human resources is based".

Finally, emphasising the influence that Taylor's concepts still exerts on modern management, Schermerhorn lists five practical lessons from scientific management that can be applied today:

- Use "results-based" compensation as an incentive for performance.
 - Design jobs using efficient work methods.
 - Select workers with appropriate abilities to perform designed jobs.
 - Train workers to perform designed jobs.
 - Train managers to support workers so that workers can perform the designed jobs.
- Conclusion

In the closing pages of *The Principles of Scientific Management*, Taylor wrote: "The general adoption of scientific management would readily in the future double the productivity of the average man engaged in industrial work." Whether Taylor's projection ever came to pass is a matter of conjecture; however, what is evident from the research, especially that offered by Drucker, Cummings and Worley, Mckenzie, Bassett, and Megginson, is that his four principles are "living" today as the underpinnings of many modern management concepts. Schermerhorn's five practical lessons learned from scientific management emphasise its applicability today.

An analysis of the research reveals that, despite negative commentary and development of new management concepts, Taylor's principles, themselves, were probably not the focus of criticisms of scientific management that resulted in new management approaches. The research shows that modern industrial engineering, reengineering projects, quality circles, and total quality management initiatives rely on workflow studies and other techniques that reflect Taylor's first principle, the scientific study of elements of a job. Current human resource recruitment and selection approaches mirror Taylor's second principle, and training and development as expressed in his third principle are certainly major

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functions of most organisations. Finally, many of today's organisations expect cooperation between managers and workers through various forms of employee involvement, reflecting Taylor's fourth principle. Instead, the criticism of scientific management seems to be directed at Taylor's specific methods for complying with the principles, and not at the principles themselves. This may explain the esteem with which Taylor is still held today by management experts.

The conclusion is that Frederick Taylor's principles for scientific management are still appropriate for managing modern organisations.

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