

## 2.8: Scientific Management

### Learning Outcomes

- Explain the concept of scientific management.
- Summarize the work of Frederick W. Taylor.
- Summarize the work of Frank and Lillian Gilbreth.
- Summarize the work of Henry Gantt.

Prior to the early 1900s, there was no management theory as we think of it today. Work happened as it always had—those with the skills did the work in the way they thought best (usually the way it had always been done). The concept that work could be studied and the work process improved did not formally exist before the ideas of Frederick Winslow Taylor.

The **scientific management** movement produced revolutionary ideas for the time—ideas such as employee training and implementing standardized best practices to improve productivity. Taylor's theory was called scientific because to develop it, he employed techniques borrowed from botanists and chemists, such as analysis, observation, synthesis, rationality, and logic. You may decide as you read more about Taylor that by today's criteria he was not the worker's "friend." However, Taylor must be given credit for creating the concept of an organization being run "as a business" or in a "businesslike manner," meaning efficiently and productively.

### Practice Question

<https://assessments.lumenlearning.co...essments/12145>

### Frederick W. Taylor



Frederick Taylor (1856–1915) is called the Father of Scientific Management.

Before the Industrial Revolution, most businesses were small operations, averaging three or four people. Owners frequently labored next to employees, knew what they were capable of, and closely directed their work. The dynamics of the workplace changed dramatically in the United States with the Industrial Revolution. Factory owners and managers did not possess close relationships with their employees. The workers "on the floor" controlled the work process and generally worked only hard enough to make sure they would not be fired. There was little or no incentive to work harder than the next man (or woman).

Taylor was a mechanical engineer who was primarily interested in the type of work done in factories and mechanical shops. He observed that the owners and managers of the factories knew little about what actually took place in the workshops. Taylor believed that the system could be improved, and he looked around for an incentive. He settled on money. He believed a worker should get "a fair day's pay for a fair day's work"—no more, no less. If the worker couldn't work to the target, then the person shouldn't be working at all. Taylor also believed that management and labor should cooperate and work together to meet goals. He was the first to suggest that the primary functions of managers should be planning and training.

In 1909, Taylor published *The Principles of Scientific Management*. In this book, he suggested that productivity would increase if jobs were optimized and simplified. He also proposed matching a worker to a particular job that suited the person's skill level and then training the worker to do that job in a specific way. Taylor first developed the idea of breaking down each job into component parts and timing each part to determine the most efficient method of working. Soon afterward, two management theorists, Frank and Lillian Gilbreth, came up with the idea of filming workers to analyze their motions. Their ideas have since been combined into one process (called time and motion studies) for analyzing the most productive way to complete a task.

Scientific management has at its heart four core principles that also apply to organizations today. They include the following:

- Look at each job or task scientifically to determine the “one best way” to perform the job. This is a change from the previous “rule of thumb” method where workers devised their own ways to do the job.
- Hire the right workers for each job, and train them to work at maximum efficiency.
- Monitor worker performance, and provide instruction and training when needed.
- Divide the work between management and labor so that management can plan and train, and workers can execute the task efficiently.

Taylor designed his approach for use in places where the work could be quantified, systemized, and standardized, such as in factories. In scientific management, there is one right way to do a task; workers were not encouraged (in fact, they were forbidden) to make decisions or evaluate actions that might produce a better result. Taylor was concerned about the output more than worker satisfaction or motivation. Taylor's work introduced for the first time the idea of systematic training and selection, and it encouraged business owners to work with employees to increase productivity and efficiency. And he introduced a “first-class worker” concept to set the standard for what a worker should be able to produce in a set period of time. Scientific management grew in popularity among big businesses because productivity rose, proving that it worked.

Today, an updated version of his original theory is used by such companies as FedEx and Amazon. **Digital Taylorism** is based on maximizing efficiency by standardizing the tools and techniques for completing each task involved with a given job. Every task is broken down to the smallest motion and translated into an exact procedure that must be followed to complete that task. Because everyone is operating in the same mechanistic way, it increases predictability and consistency while reducing errors. It is relatively easy for managers to replace workers and retain the same productivity. The criticism of this type of management approach is similar to that of Taylor's original theory: It reduces worker creativity; it requires management to monitor all aspects of employee behavior; and it is unforgiving to workers who don't meet the standard.

### ? Practice Question

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## Frank and Lillian Gilbreth

Two more pioneers in the field of management theory were Frank and Lillian Gilbreth, who conducted research about the same time as Taylor. Like Taylor, the Gilbreths were interested in worker productivity, specifically how movement and motion affected efficiency.



Lillian Gilbreth. The book and film *Cheaper By the Dozen* were based on her and Frank's experiences raising twelve children according to their theories of time and motion studies.

As stated above, the Gilbreths used films to analyze worker activity. They would break the tasks into discrete elements and movements and record the time it took to complete one element. In this way, they were able to predict the most efficient workflow for a particular job. The films the Gilbreths made were also useful for creating training videos to instruct employees in how to work productively.

Taylor and the Gilbreths belonged to the **classical school of management**, which emphasized increasing worker productivity by scientific analysis. They differed, however, on the importance of the worker. Taylor's emphasis was on profitability and productivity; the Gilbreths were also focused on worker welfare and motivation. They believed that by reducing the amount of motions associated with a particular task, they could also increase the worker's well-being. Their research, along with Taylor's, provided many important principles later incorporated into quality assurance and quality control programs begun in the 1920s and 1930s. Eventually, their work led to the science of ergonomics and industrial psychology. (**Ergonomics** is the study of people in their operating environment, with the goal of increasing productivity and reducing risk of work-related injury.)

### ? Practice Question

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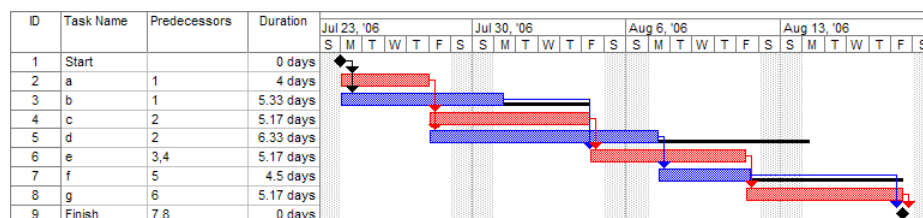
You can watch some of the Gilbreths' films below to get an idea of how they documented their time and motion studies in an effort to increase efficiency and safety.

A video element has been excluded from this version of the text. You can watch it online here: <http://pb.libretexts.org/pom/?p=86>

## Henry Gantt

Henry Gantt (1861–1919) was also an associate of Taylor. He is probably best known for two key contributions to classical management theory: the Gantt chart and the task and bonus system.

The **Gantt chart** is a tool that provides a visual (graphic) representation of what occurs over the course of a project. The focus of the chart is the **sequential performance of tasks** that make up a project. It identifies key tasks, assigns an estimated time to complete the task, and determines a starting date for each element of a task. Gantt differentiated between a **terminal element** that must be completed as part of a larger task. The related terminal elements together created what he called the **summary element**.



An example of a simple Gantt chart

The Gantt chart has multiple benefits for project management:

- It aids in the breakdown of tasks into specific elements.
- It allows for the monitoring of projected timelines.
- It identifies which tasks are dependent upon a prior task or element and which are independent and can be completed at any time.

Let's apply the Gantt chart principles to a simple project. Imagine that you want to paint a room. The summary element is the finished, painted room. The individual terminal tasks might include calculating the square footage of the room, preparing the walls, choosing the paint, purchasing the paint, putting down the drop cloth, taping the windows, applying the paint, and final cleanup. Some of these elements are independent, and some elements are dependent upon others. Purchasing the paint is dependent upon knowing the square footage and choosing the paint color. Before painting can start, the walls must be prepared and the paint must be purchased. But purchasing the paint is not dependent upon preparing the walls—these tasks could be started at the same time.



There are several distinct tasks involved in painting a room.

Gantt also promoted the **task and bonus plan** that modified Taylor's "a fair day's pay for a fair day's work" premise. Gantt wanted to establish a standard (average) time for a piece of work or task. Then, if a worker took more than the standard time, his pay was docked. But if he took less time, he was paid for the additional pieces of work and a bonus of up to 20 percent more. Also known as the **progressive rate system**, this plan was preferred by workers who were willing to work harder for additional wages.

Although Gantt is not the best known of the classic management theorists, many of his ideas are still being used in project management.

### ? Practice Question

<https://assessments.lumenlearning.com/assessments/12149>

## Key Points

Scientific management was the first widespread promotion of rational processes to improve efficiency. The goal was to develop a standard against which work performance could be measured. Training became an important part of the management process. By the 1930s, however, many unions and workers were suspicious of the intentions of scientific management.

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