Frederick Taylor

“The Father of Scientific Management”

And

The Evolution of Management Theory
The travel of a straight line is an absolute model of efficiency at its purest.

A

B

The fastest way from point A to point B is a straight line.

Scientifically, it is a proven fact.
Mathematically, it is the shortest distance, therefore takes the less time.
Frederick Taylor's life (1856-1915)

- Frederick Winslow Taylor, was born on March 20, 1865, into an upper class liberal Philadelphia family.
- His father a lawyer and his mother a feminist both believed in high thinking and plain living.
- Taylor was always counting and measuring things to figure a better way of doing something.
- At age twenty-five, Taylor earned an engineering degree at the Stevens Institute of Technology in New Jersey.
- Worked as a machinist and pattern maker in Philadelphia at the Enterprise Hydraulic Works, then became a common laborer at the Midvale Steel Company.
- He started as shop clerk and quickly progressed to machinist, foreman, maintenance foreman, and chief draftsman.
- Within six years he advanced to research director, then chief engineer.
Historical Background

Industrial Revolution
The Industrial Revolution was widespread replacement of manual labor by machines that began in Britain in the 18th century with the introduction of steam power and powered machinery (mainly in textile manufacturing).

It created a specialized and interdependent economic life and made the urban worker more completely dependent on the will of the employer than the rural worker had ever been.

It changed our societies from a mainly agricultural society to one in which industry and manufacturing was in control.
Negative aspect of Industrial Revolution
After the Civil War (1861–1865) industry begins to change.
- National industries grew out of local trades -- steel, glass, textiles, and shoes and what were small factories became large plants.
- Owners of capital became wealthier with mass production, and workers received little for their efforts.
- Problems:
  - carelessness,
  - safety,
  - inefficiencies,
  - soldiering (worker foot dragging) on the job.
Taylor’s main focus:
Maximize workers capacity and profits

PROBLEM:
Get employees to work at their maximum capacity

PRIMARY FOCUS:
TASKS
Taylor's core values

- The rule of reason
- improved quality
- lower costs
- higher wages
- increased output
- labor-management

- experimentation
- clear tasks and goals
- training
- stress reduction
- careful selection and development of people
Scientific Management

- The systematic study of the relationships between people and tasks for the purpose of redesigning the work process for higher efficiency.
  - Defined by Frederick Taylor in the late 1800’s to replace informal rule of thumb knowledge.
  - Taylor sought to reduce the time a worker spent on each task by optimizing the way the task was done.
"The Principles of Scientific Management"

- Published in 1911
- Prior to scientific management work was performed by skilled craftsmen who had learned their jobs in lengthy apprenticeships.
- Scientific management took away much of this autonomy and converted skilled crafts into a series of simplified jobs that could be performed by unskilled worker who easily could be trained for the task.
Soldiering

- Working in the steel industry, Taylor had observed the phenomenon of workers’ purposely operating well below their capacity (soldiering)

- Reasons
  - Believe that if they become more productive job would be eliminated
  - Non-incentive wage systems
  - Rule-of-thumb training methods - inefficient

To improve efficiency Taylor began to conduct experiments to determine the best level of performance and what was necessary to achieve this performance.
Time and motion studies

- Experiments that were performed to determine the one best way to perform particular job.
  - Pig Iron
  - The science of shoveling
  - Bricklaying
Pig Iron

- if workers were moving 12 ½ tons of pig iron per day and they could be incentives to try to move 47 ½ tons per day, left to their own wits they probably would become exhausted after a few hours and fail to reach their goal.
- However, by first conducting experiments to determine the amount of resting that was necessary, the worker's manager could determine the optimal timing of lifting and resting so that the worker could move the 47 ½ tons per day without tiring.
- Not all workers were physically capable of moving that, so workers should be selected according to how they are suited for a particular job.
The science of shoveling

- determined that the optimal weight that a worker should lift in a shovel was 21 pounds.
- The shovel should be sized so that it can handle that.
- Prior to that workers used their own shovels.
Bricklaying

- focused on specific motions,
- decreased the amount of motions required to lay bricks.
How bricks are scientifically laid

Scientific Management: By Frederick W. Taylor

How bricks are scientifically laid

One further illustration will serve to show the effectiveness of Scientific Management in an occupation far more skilled than carrying pig iron or shovelling.

Bricklaying is, perhaps, the object of the mechanic arts. Two thousand years before Christ bricks were laid as they are now laid. The same kind of brick, the same kind of mortar, the same kind of trowel, and the same kind of scaffold are now used as were used at that period. If any trade had reached a point at which economic study would be non-productive, we would therefore expect to find the bricklaying trade in that condition. Because a few years of work with thousands of men working at it throughout the world should certainly have yielded a good system of bricklaying. Some four years ago Mr. Gilbert was interested in the subject of Scientific Management. During his youth Mr. Gilbert had made a very close and accurate study of bricklaying, and he said to himself that if there was anything in the new idea of

new study it ought to be as useful in bricklaying as it was in anything else.

He therefore made an intensive study of each movement of the bricklayer. He placed himself on a scaffold with a pile of bricks on the floor and the mortar board alongside him, a brick wall being built at the top. He wrote down all of the movements the bricklayer made.

To eliminate these waste motions, Mr. Gilbert decided to give a great deal of work devoted to studying the movements of the bricklayer. He wrote down all of the movements the bricklayer made.

The first motion made by the bricklayer was to take a step to the right. Was that step really necessary? Next, after taking the step to the right, the bricklayer stopped to take the mortar board. He then placed the brick on the pile of bricks, and raised his body up again, either to full height or to partial height. Was it really necessary for the bricklayer to raise his body, rather than putting it down, to get a better view of the wall?

Mr. Gilbert's next step was to find out how many times the bricklayer turned his head to look around the wall. He found that on average the bricklayer turned his head to look around the wall 10 times per minute.

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The Old Way
The New Way

The management must also recognize the
broad fact that workmen will not submit to
this more rigid standardization and will not
work extra hard, unless for extra pay.

Mr. Gilbreth's method of bricklaying has
offered a simple illustration of true and after
management (each one in his own way) to help
each workman individually, not only by
studying his methods and his shortcomings
and teaching him better methods, but also by
seeking that all other workmen, with whom
he comes in contact, help him by
the work.

The writer has seen how fully into Mr.
Gilbreth's methods in order that it may
be perfectly clear that this increase in output
and work could not have been obtained
under the management of "initiative and
incentive." And that his success has been
due to the use of the four elements which
constitute the essence of Scientific
Management.
Four Principles of Scientific Management and increased efficiency

1. Study the ways jobs are performed now and determine new ways to do them.
   - Gather detailed *time and motion* information.
   - Try different methods to see which is best.
2. Codify the new methods into rules.
   - Teach to all workers the new method.
3. Select workers whose skills match the rules.
4. Establish fair levels of performance and pay a premium for higher performance.
   - Workers should benefit from higher output.
Scientific management revolutionized industry: it explained how to increase production by working smarter, not harder.

- Up until that time, increasing output meant:
  - more hours,
  - more employees,
  - more raw materials, and more costs.
- Scientific management uses basic logic to show how:
  - standardization,
  - productivity, and
  - division of labor

increase efficiency.
Underlying Themes

- Managers are intelligent; workers are and should be ignorant
- Provide opportunities for workers to achieve greater financial rewards
- Workers are motivated almost solely by wages
- Maximum effort = Higher wages
- Manager is responsible for planning, training, and evaluating

Theory X or Y?
## Theory X

The average employee is lazy, dislikes work, and will try to do as little as possible.

To ensure that employees work hard, managers should closely supervise employees.

Managers should create strict work rules and implement a well-defined system of rewards and punishments to control employees.

## Theory Y

Employees are not inherently lazy. Given the chance, employees will do what is good for the organization.

To allow employees to work in the organization’s interest, managers must create a work setting that provides opportunities for workers to exercise initiative and self-direction.

Managers should decentralize authority to employees and make sure employees have the resources necessary to achieve organizational goals.
Success of scientific management and its pros
• Revolutionized industry because it explained how to increase production by working smarter, not harder.

• Beneficial organizational model because created standards.

• Laid the foundations of how businesses should be run from an organizational standpoint.

• Increased a worker’s output, allowing them to take home a greater pay than ever before.

• The worker would concentrate on the day-to-day tasks asked of them, and not have to worry about the decision making.

• Decisions were left to management who were able to take the best course of action after careful study, planning, and implementation of pre-defined standards.
Influence of scientific management beyond the assembly line

The “Principles of Scientific Management” were translated into Chinese, Dutch, French, German, Italian, Russian, and Japanese.
Lenin and Taylor System

- One of the first countries outside of the US to use scientific management was the newly formed Soviet Union.
- Lenin believed that in order to transform the USSR from the nearly feudalistic country that it was under the czars into a major industrial power, a mass educational effort was necessary.
- He believed that Taylor’s methods could be used to manage the entire nation.
- The Soviet Union’s famous five-year plans that set goals for industrial productivity and economic growth were a direct result of scientific management principles.
Japan and Taylorism

- Japanese industry also adopted Taylor’s techniques.
- One of the first disciples of scientific management in Japan was a man named Ueno Yoichi.
- In 1919, Ueno was hired by the Lion Toothpowder Company, where he increased the productivity of its packaging department by 20 percent while reducing the area of working space by 30 percent and cutting work time by one hour per day.
- Ueno became a leading proponent of scientific management in Japan.
- In the years leading up to the Second World War, many in Japanese industry embraced Taylorism.
Progressive reformers

- As scientific management became more popular in industry during the early part of the twentieth century, it began to influence other segments of society and culture, particularly in the progressive movement.
- Gilford Pinchot, the famous conservationist, who was appointed by President Theodore Roosevelt to head what is now known as the Department of the Interior, saw his work as, “efficient management of natural resources.”
- Progressive reformers, interested in reducing public corruption carefully, began to study things like the amount of money spent on constructing things like sewer lines versus the amount of people living in each square block.
- Home economists, did time and motion studies of housework, in the hopes that it would give women more time to educate themselves.
- A certain type of technical utopianism emerged.
Failings of scientific management and the development of alternatives
Problems with Scientific Management

- Managers frequently implemented only the increased output side of Taylor’s plan.
  - Workers did not share in the increased output.
- Specialized jobs became very boring, dull.
  - Workers ended up distrusting the Scientific Management method.
- Workers could purposely “under-perform.”
  - Management responded with increased use of machines.
- The core jobs dimensions of skill variety, task identity, task significance, autonomy and feedback all are missing.
The Evolution of Management Theory
QUESTION: HOW DO YOU KNOW WHICH MANAGEMENT TECHNIQUES WORK BEST?

LOGICALLY, DOESN'T THE EXISTENCE OF THOUSANDS OF MANAGEMENT BOOKS SHOW THAT NO ONE KNOWS WHAT WORKS BEST?

THE TRICK IS KNOWING WHICH ONE TO READ.

NOW YOU'RE JUST MAKING ME MAD.