The Principles of Scientific Management

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1 Abstract

In the late 19th century, Frederick Winslow Taylor was a foreman at a steel plant in Pennsylvania, US. While observing his workmen, he identified multiple reasons why workers would, sometimes even deliberately, stay behind Taylors expectations of how fast a set of tasks could be completed. Believing that major improvements in productivity were possible, Taylor started to develop a new type of management, which aims to perfect and optimize how every task is done. He formalized this new "Scientific Management", sometimes also referred to as "Taylorism", in his book *The Principles of Scientific Management*, which was published in 1911. Even though Scientific Management received a lot of criticism over the years, the positive effects on productivity and effectiveness were undeniable, resulting in aspects of the management still being visible in today's production routines.

2 Historical context

In 1880, at age 25, Frederick Winslow Taylor became foreman at the Midvale Steel plant in Pennsylvania, US. He was impressed by how much his workmen would stay behind his expectations of how much should be possible in a single day [3]. While investigating, he identified several reasons for that:

- Each worker was responsible for a complete production routine, and there was no specification of how to do it exactly.
- Employers were looking for "the perfect man" for the job, instead of telling workers how do to it.
- Responsibility of how the work was done lay with the worker.
- Workers would choose the easiest way or the way of least resistance.

Taylor was convinced that he could minimize losses due to these reasons by applying scientific methods to manufacturing.

3 The Principles of Scientific Management

3.1 Fundamentals

The Fundamentals of Scientific Management is the first chapter in [1] after the introduction. Here, Taylor prepares the basis for his principles by showing how both the task of the management and why workers work less than they could.
According to Taylor, the main task of management is to make maximum prosperity possible for both the employer and the employee. This can be achieved by a simple chain of events: By increasing the productivity of workers, the company makes more profit. More profit then results in higher wages. This is only possible, if both sides do their absolute best. Therefore, the views of employers and employees are not necessarily contradictory.
On the other hand, Taylor identified three reasons, why employees would deliberately work less than they could ("to soldier"):

1. Belief, that an increase in output of a single worker or machine would result in the dismissal of then obsolete other workers.

2. Workers are paid for work they done. Not showing, how fast it can actually be done, results in higher wages for less work.

3. "Rule-of-thumb" methods still had more importance than scientific approaches to solving a problem.

3.2 Principles

The Principles of Scientific Management is the next and last chapter of [1]. Before presenting his principles, Taylor gives an overview about a different and widely used type of management: "Initiative and Incentive". The initiative of a worker describes "his best endeavors, his hardest work, all his traditional knowledge, his skill, his ingenuity, and his good-will" [1], and it's the task of the management to make workers use their whole initiative. The management accomplishes this by giving incentive, for examples promotions, raising wages and similar aspects.
In Taylors new Scientific Management, incentive is only given in an indirect way: Only by sticking to his principles, an increase in productivity and therefore wages can be achieved. Taylors four principles of scientific management are:

1. They develop a science for each element of a man's work, which replaces the old rule-of-thumb method.

2. They scientifically select and then train, teach, and develop the workman, whereas in the past he chose his own work and trained himself as best he could.

3. They heartily cooperate with the men so as to insure all of the work being done in accordance with the principles of the science which has been developed.

4. There is an almost equal division of the work and the responsibility between the management and the workmen. The management take over all work for which they are

better fitted than the workmen, while in the past almost all of the work and the greater part of the responsibility were thrown upon the men.

According to Taylor, the advantage of Scientific Management over Initiative and Incentive lies in combining the initiative of the worker and the new tasks of the management. This results in an even higher productivity and effectiveness.

4 Scientific Management

When put into practice, Scientific Management actually yielded good results. After finding the "one-best-way" to do something (principle 1), workers would be trained to do that exact method over and over again (principle 2). Workers would also be supervised and checked using different methods (principle 3). For example, stopwatches were used to measure a workers performance, until they were forbidden in 1916 due to the Hoxie-report [2]. By selecting the methods, the management automatically took on more responsibility, because if those methods were not good, it's now the managements fault and no longer the workers (principle 4).
But even though productivity increased, Scientific Management received criticism for multiple core aspects. After strikes in weapon factories, a special committee, which commissioned the Hoxie-report [2], was formed to examine Scientific Management and its methods [4]. Criticism regarding Scientific Management includes, but is not limited to, the results of the Hoxie-report and the following bullet points:

- Measuring time and fatigue is too inaccurate, and destroys the solidariy between workers.
- Work is now split up in physical and mental work, which results in few highly qualified and many under qualified workers.
- Physical work is split up in to many small parts, resulting in monotonous repetition.
- Scientific management itself results in outsourcing and lower wages, because now even unskilled workers can complete more complex tasks by simply following instructions.

In spite of this, the ideas of Scientific Management spread internationally and influenced others to implement or extend them.

5 Scientific Management today

While Scientific Management in it's original form is not used today anymore (because of the aforementioned criticism), some aspects are still visible in today's industry. An example for this is the production line for new cars: the same steps have to performed on every car, and while some can be completed by machines, workers are still needed. Delays caused by mistakes or not following the best procedure slow down the whole process and can potentially result in losses.

Even though it was initially developed for the secondary sector of the economy, sometimes it can be found in the tertiary sector as well: Fast food production and templates for documents or other objects are just two examples for how in the beginning, the best way to do something was found, and then reused over and over again by the employees.

References

[1] Frederick Winslow Taylor. The Principles of Scientific Management, 1911.
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[2] Robert Franklin Hoxie. Scientific management and labor. Appleton, New York 1915
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[3] Wikipedia. Scientific Management
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[4] Wikipedia. Taylorismus
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