

## STUDY ON MANAGEMENT OF INDUSTRY 4.0: A CENTURY IN THE MAKING

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### ABSTRACT

The adoption of new technologies, such as artificial intelligence, the internet of things, smart gadgets, and more, into all facets of the economy is known as industry 4.0, also known as the fourth industrial revolution. The application of algorithmic management in particular brings rewards and debate. Industry 4.0, like earlier revolutions, promises increased production but also runs the potential of causing negative social upheaval. Industry 4.0 is now being implemented, and the technologies that come with it have undercut worker security, de-skilled employment, diminished worker autonomy, and given bosses easy accessibility to their employees' lives.

Industry 4.0 will require fresh investment in unproven technologies to be implemented successfully. Although these new technologies have great promise, they may also have a detrimental effect on employees, which might hurt long-term profits. Consequently, it becomes So it is logical to ask: at what point do such expenses outweigh any potential advantages for the employee?

This paper will offer a way for making Industry 4.0 more sustainable by examining the historical case of Scientific Management and contemporary implementations.

**KEYWORDS:** - sustainable, industry 4.0, production, Industrial Internet.

### I. INTRODUCTION

In this paper, it is suggested that the managerial adjustments brought about by Industry 4.0—particularly those pertaining to algorithmic management (AM)—are an extension of scientific management (SM) concepts (Kellogg, Valentine, and Christin 2020). There is a clear connection between Taylorism, Industry 4.0, and SM. These ideas can be utilized more effectively and broadly thanks to Industry 4.0.

This essay will concentrate on Industry 4.0's AM component. It is crucial to remember that without several other technologies that comprise Industry 4.0, AM could not be as effective as it is. It's also critical to realize that Industry 4.0 encompasses more than just a collection of technologies; it also takes into account how those technologies are applied and the business relationships they either strengthen or damage.

The remainder of the paper will then cover SM and how it has influenced modern management practice.

SM was formed at a time when labor relations underwent a considerable change, as well as a revision of labor laws. Labor unions were forming and controlling the workplace (Devinat, 1926). One of the tactics used by business owners to retake control of the workplace was SM (Nelson, 1980).

Owners could utilize SM as a mechanism to hand over authority from employees to managers. In the past, rather than the owners, the work was supervised by supervisors, who were often the most senior and seasoned shop floor employees and were seen as being strongly connected with the workforce (Devinat, 1926). A new class was made by SM.

### II. LITERATURE REVIEW

The professional manager was a new type of employee introduced by SM. Compared to veteran artisans; these new managers were more closely allied with the owners (Wagner-Tsukamoto, 2007). Taylor wanted SM to improve relations between supervisors and employees. But when it was put into practise, it resulted in a shift of authority from employees to managers, which had the opposite effect and separated them (Wagner-Tsukamoto, 2007). The success of SM was partly due to this transfer of power (Schachter, 2010). When it comes to the balance of power over the workplace and labor practices, Industry 4.0 and SM are comparable. The power struggle SM was involved in at work is still going on now. The conflict includes Industry 4.0. Workers' legal status hasn't changed as a result of SM, but there is currently a trend toward diminishing their rights and

protections. One such trend is the gig economy, where workers' legal status is less favorable than that of traditional employees (Steinberger, 2017).

This lowers labor expenses and transfers risk from the employer to the employees (Huws, 2016). In terms of rights and protections, this causes the workforce to more closely resemble workers at the beginning of the 20th century, who had fewer rights and were more susceptible to being fired (Devinat, 1926; Cunningham-Parmeter, 2016).

As managers' monitoring capabilities continue to grow, Industry 4.0 also makes it simpler to conceal decision-making behind opaque algorithms. (2017) Boewe and Schulten Although Industry 4.0 may advance new technologies, the management techniques it employs have existed for a very long time. Modern management and SM have a well-established connection. It has had a profound impact on management theory and practise far beyond the confines of the production floor (Schachter, 2010; Parker and Jeacle, 2019).

The popularity of SM has been associated with changes in society and politics that have an impact on the workplace. The growth of SM outside of the manufacturing was partly a result of technological advancements (Parker and Jeacle, 2019).

According to some academics, Taylor would not have backed Taylorism because, in the end, SM did not live up to Taylor's goal of closer relations between managers and employees (Taksa, 1992; Wagner-Tsukamoto, 2007).

The workplace has been impacted and influenced by SM for a long time. This is clearly demonstrated by the widespread use of the word "Taylorism" and the corresponding modifications it implies (Fischer and Sirianni, 1994). Taylorism is linked to worker de-skilling, increased oversight, and less autonomy. According to SM, Industry 4.0 recreates the political interactions between employees and management (Cullinane and Cushen, 2019; Galière, 2020).

Despite the fact that there are numerous explanations of Industry 4.0, they typically fall into one of two groups. The first is the Industry 4.0 agenda, which is the vision set forth by its advocates. Supporters claim that the modifications will give employees more freedom and flexibility (Duggan et al., 2020).

An Australian research of its effects on workers revealed that Industry 4.0 can enhance the working environment by decreasing repetitive jobs, enhancing safety, and enhancing ergonomics (Ejsmont, 2021). According to Industry 4.0 detractors (Rosenblat, Kneese and Boyd, 2014; Boewe and Schulten, 2017), it fosters terrible working conditions and threatens employees' rights. Below are two illustrations of how Industry 4.0 is having an impact.

Online retail is characterised by customer benefits such as personalised suggestions and next- or same-day delivery made available by Industry 4.0 technologies. Amazon has dominated the online retail market thanks to the adoption of Industry 4.0 technologies. According to Boewe and Schulten (2017), Amazon has built an electronic panopticon from which it can extract enormous volumes of data. Following that, this information is used to allocate jobs, manage employee performance, and, in some situations, decide whether to fire employees. Customer's reviews are one of many different tactics used by Uber to keep an eye on its employees. These ratings are crucial since a driver's access to the app and consequently their capacity to work will be restricted if their rating falls too low (Möhlmann and Henfridsson, 2019).

Uber also restricts the kinds of vehicles that drivers can use and keeps track of the services that drivers provide as well as the routes they take (Steinberger, 2017). It is obvious that when Industry 4.0 is put into effect, it encompasses more than simply a collection of technology; it also includes management techniques and even completely replaces some supervisory tasks (Todol-Signes, 2020).

Instead of introducing new management techniques, Industry 4.0 adapts existing ones. Therefore, algorithmic management is made to complement and carry out such methods. Industry 4.0 technology may enable new practises, but in actuality, they just inherit those that currently exist and are founded on SM principles (Parker and Jeacle, 2019; Günsel and Yamen, 2020). This does not imply that there won't be any differences as a result of the employment of new technology. Workers, for instance, connect to algorithmic decisions differently than human decisions, believing algorithms more in some cases and humans more in others (Lee et al., 2015; Cappelli, 2018).

Industry 4.0 has the potential to eliminate the human factor from decision-making, and it frequently intends to do so. Reducing mistake, accelerating decision-making, and eliminating prejudice are common reasons for removing humans from the decision-making process (Gil et al., 2020). This may have unanticipated negative effects. For instance, although computer decisions are frequently perceived as having fewer biases than human ones, they frequently reproduce such prejudices (Vidal and Menajovsky, 2019).

A human manager's presence also makes it possible to deviate from the algorithm when necessary, something an algorithmic manager cannot accomplish. One such case involved a terrorist assault, in which Uber came under fire for failing to turn off the algorithm's surge pricing, which caused a sharp cost spike for those fleeing the scene. The fact that SM's application is restricted to a single site is one of its drawbacks. Although SM can be applied in several settings, each application is unique. Industry 4.0 enables the use of a single incident of management techniques among widely scattered employees (Curchod et al., 2020).

### **III. RESULTS AND DISCUSSION**

Frederick Taylor created Scientific Management (SM) at the beginning of the 20th century. SM was designed to manage labour with the same level of precision as engineering approaches (Nelson, 1980). According to Nelson (1980) and Wagner-Tsukamoto (2007), it was implemented with the help of a specialist manager who made meticulous observations and gathered information about the time of tasks and the resources employed.

The most senior shop floor worker would have previously handled the duties of developing a set of rules for how the work should be done, assigning assignments, and calculating pay rates. These functions would now be handled by the specialist manager. The use of a professional manager who might not have been an expert in the work they were overseeing was a significant departure from prior conventions (Nelson, 1980).

Control was shifted from employees to management as a result of the deployment of SM. Taylor may not have planned it this way, but management techniques that evolved from SM include this as a feature. Therefore, it required handing over responsibility from employees to managers and the utilisation of data to determine pay rates and assign tasks in the best way possible.

### **IV. CONCLUSION**

Industry 4.0 leverages and adapts existing management processes rather than introducing its own. These habits are intended to be supported, put into practise, reinforced, and embedded by the algorithmic manager. This would imply increase oversight, decreased autonomy, and increased danger for employees (Todol-Signes, 2020). Amazon has received criticism for how its algorithmic management may squeeze every last drop of effort from employees, leaving many sleeping in their automobiles rather than going home between shifts (Bruder, 2017). Uber has exploited technology to evade legislation and scrutiny, making it more difficult for employees to protect themselves (Wong, 2017).

The United Nations' vision of sustainable employment is at odds with these tendencies. The controversy surrounding the introduction of SM at the turn of the 20th century is reflected in this battle (United Nations, no date). Similar to prior supporters of SM, proponents of Industry 4.0 claim that it will help both corporations and employees. However, SM's eventual form fell short of fulfilling that promise (Nelson, 1980). A similar discussion surrounds Industry 4.0. The potential of sustainable development is there, but it won't come easily; we'll have to fight for it.

Winning the public discussion is insufficient, according to the usage of Taylorization and Scientific Management; actual action is needed. Not only are transparency and the ability of employees to enforce protections crucial, but also sound regulation of data gathering and algorithmic management. In order for Industry 4.0 to fully realise its potential for sustainability, management techniques that are not grounded in SM will eventually need to be developed. Despite the fact that there are many different management techniques, the ones that predominate have their roots in SM. Although there are many different management techniques, in reality, the ones that are most widely used have their roots in SM, and the emergence of Industry 4.0 doesn't seem to be any different.

Industry 4.0 can certainly create sustainable employment; the issue is how to make sure that it will. Although there are many different management techniques, in reality, the ones that are most widely used have their roots in SM, and the emergence of Industry 4.0 doesn't seem to be any different.

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