

Combined Application of Lean Manufacturing Systems and Industry 4.0 in a Manufacturing Companies

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INTRODUCTION

The modern business environment is dynamic and competitive, so companies must adapt to constant changes in the environment and the market, consider not only traditional management methods, but also new, innovative tools. However, no matter how dynamic the modern business environment is, the goal of every company remains the same quality product and a satisfied customer, so companies are increasingly talking about the benefits of innovation in modern production. Innovation is often associated with new products that are needed to adapt to the ever-changing needs of the customer, as more and more people want to modernize their household items to ensure convenience and efficiency.

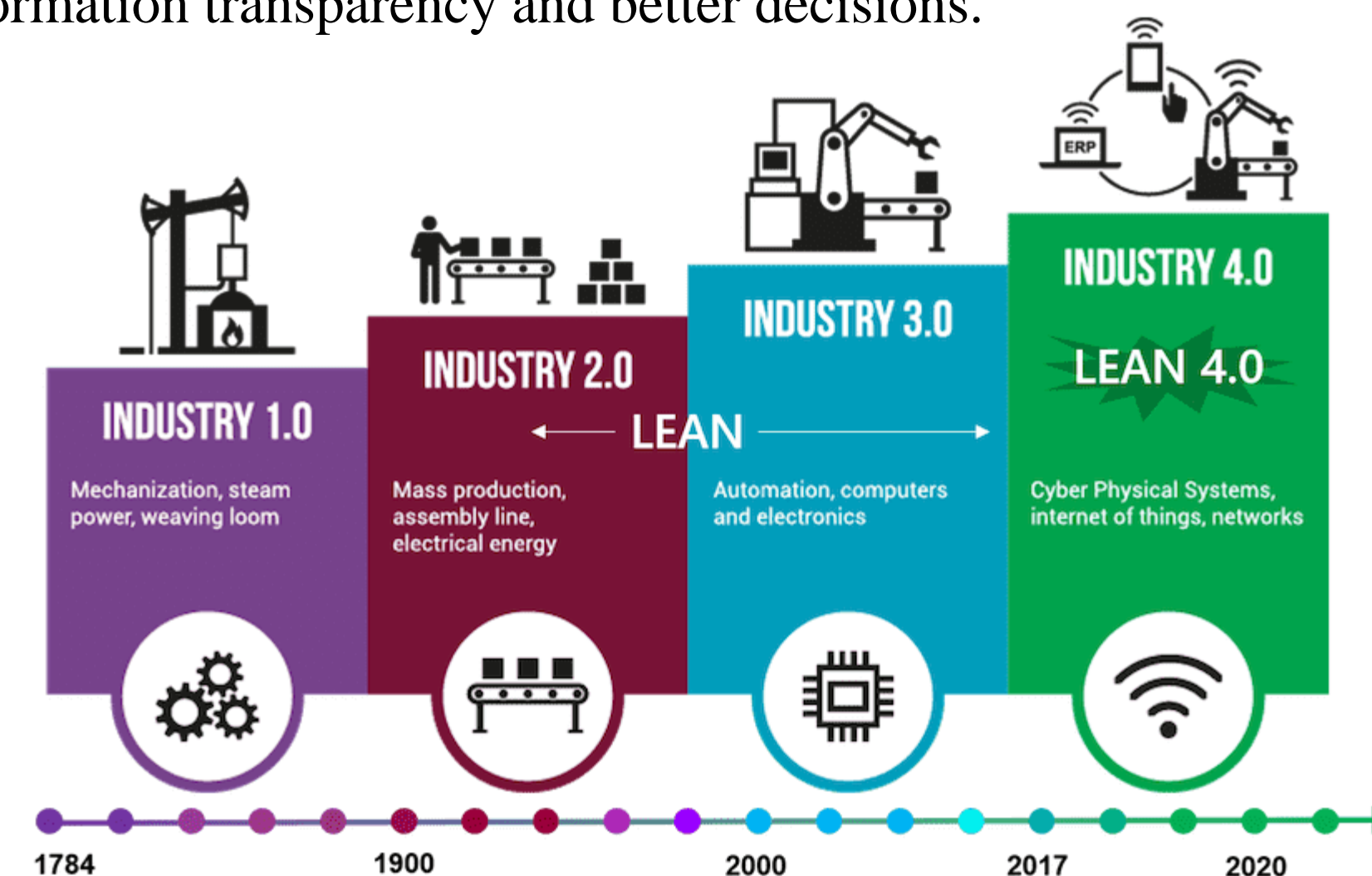
LEAN MANUFACTURING

The strategy of the Lean production system is focused on the continuous improvement and development of all forms of waste from the supply chain and production system in order to reduce costs, improve quality and add value to customers. Lean product development involves a set of practices and tools that create the reusable knowledge that is needed to consistently and efficiently implement all the necessary processes to create a high value-added product. The Lean manufacturing system is constantly evolving, with a variety of tools and methods tailored to address the specific problem, a long-term mindset to create the right mindset, and a strong focus on analyzing value-free flows to ensure employee and customer satisfaction. efficiency gains.

INDUSTRY 4.0

Industry 4.0 technology trends are related to many information, digitized operations, and advanced manufacturing technologies, so trends can be divided into two categories: facilitation technologies and key technologies in terms of their functionality. We are now in the fourth industrial revolution, also referred to as Industry 4.0. Characterized by increasing automation and the employment of smart machines and smart factories, informed data helps to produce goods more efficiently and productively across the value chain.

Flexibility is improved so that manufacturers can better meet customer demands using mass customization—ultimately seeking to achieve efficiency with, in many cases, a lot size of one. By collecting more data from the factory floor and combining that with other enterprise operational data, a smart factory can achieve information transparency and better decisions.



LEAN 4.0

The Lean manufacturing system has long been known and accepted in manufacturing companies, but it is no longer enough to remain competitive, which is why the concept of Lean and Industrial 4.0 principles - Lean 4.0 - has emerged. The Lean 4.0 system is increasingly discussed in various companies, academic literature, and research institutions, so when analyzing the Lean 4.0 system, we can see that there are several approaches that would help to successfully implement and apply this concept

- The Lean manufacturing system is a prerequisite for the Industrial 4.0 system, which would simplify automation and digitization;
- The Lean manufacturing system is not required for the Industrial 4.0 system, as the Lean manufacturing system is limited and inflexible, and the Industrial 4.0 system allows for real-time information collection;
- The guarantee of success is the joint interaction of concepts between Lean and Industry 4.0, which creates mutual support between the two systems between two different paradigms.

By using the Lean 4.0 concept for companies, companies can not only eliminate production discrepancies but also achieve various benefits. The Lean 4.0 concept increases the company's flexibility, such as new sensors, software, allowing equipment to automatically load the required machining program, and the required tools according to a certain code, which allows the process to be completed significantly faster. With the introduction of Lean 4.0, companies are also increasing efficiency by, for example, collecting data on ongoing processes much faster using a sensor system, ensuring faster data analysis, error detection and troubleshooting. In addition to the increase in efficiency, it is known that the speed also increases, the operations take place faster, the communication becomes faster, because when the data is received in real time, the response time is significantly shortened, and it allows to monitor production trends. Lean 4.0 delivers better quality by enabling error analysis based on visual inspections, as well as training and implementing employee accountability and encouraging shoulder quality checks. And of course, the Lean 4.0 system provides security because the company has built-in sensors that reduce the risk of injury to employees from a variety of devices.

CONCLUSION

Lean 4.0 is an innovative opportunity for companies to gain a foothold in the market and remain competitive, as it is a union of two different concepts that not only solve production problems, but also automate, digitize and manage data faster, improving not only enterprise communication but also employee well-being, the level of satisfaction, which ensures greater efficiency of the company.



Lean optimization alone **15-20%** cost reduction.

Industry 4.0 alone **10-15%** cost reduction.

Lean 4.0 generates benefits beyond those that either approach achieves separately, because up to **40%** cost reduction!