

Bachelor's Thesis

**KAIZEN STRATEGIES FOR IMPROVING PLANNING AND PRODUCTION
FLOW IN PHARMACEUTICAL ENVIRONMENTS**

Double degree in Chemical Engineering and Industrial Electronics and Automation.

In collaboration with: Kaizen Institute

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Report and Annex

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1 Abstract

2 Resum

3 Resumen

4 Glossary

Índex

1 Abstract	1
2 Resum	2
3 Resumen	3
4 Glossary	4
5 Preface	5
5.1 The KAIZEN Philosophy	5

5 Preface

5.1 The KAIZEN Philosophy

After World War II, Toyoda Kiichiro, then president of the Toyota Motor Company, saw the need to catch up with America to assure the survival of the automobile industry of Japan. Taiichi Ohno, Toyota's engineer, had a challenge: how to build a diversified line of products with the limited equipment Toyota possessed at the time. Instead of using batch production, he designed a system of integrated production that used one-piece flow, demonstrating that a trade-off between quality and productivity does not need to exist (Netland and Powell, 2016). Aligned with other practices, Toyota Production System (TPS) was born to defy the premise that bigger batches mean lower costs.

TPS, which ultimate goal is the absolute elimination of waste, is based in two pillars: just-in-time (JIT) and autonomation (automation with a human touch). The lack of the necessary capital resources to support high inventory levels was solved with the implementation of a just-in-time pull system. JIT means "to produce the necessary units at the necessary quantities at the necessary time". A company establishing this flow throughout can approach zero inventory. With autonomation, Toyota intended to create a built-in automatic checking system against small abnormalities. With this prevention mechanism, defective products were not produced. That was not the only advantage. While the machine is working properly, employees are liberated. Consequently, one worker could attend multiple machines, increasing production efficiency. Furthermore, autonomation came as a facilitator of improvement. Stopping the machine creates awareness and, through the total comprehension of the problem, improvement measures can be taken. (Ohno, 1988) Lean, based on TPS, is a methodology that accentuates customer needs, to improve quality and reduce costs through continuous improvement and employee involvement (Graban, 2008). Kaizen, a Japanese word, refers to the concept of continuous improvement. It does not intend to be mistaken as innovation or disruption and elevated costs. On the other hand, Kaizen is about small and subtle improvements. It is a low-cost low-risk process that assures incremental progress and sustainable changes in the long term.

At the beginning of the 21st century, Toyota Motor Company surpassed General Motors and became the world leader in automobile production, expanding and elevating the Kaizen concept for its key role in the company's success. Kaizen's methodology is based on five fundamental principles:

- Create customer value

Value is what the customer is willing to pay for. Using a market-in approach to make informed decisions based on what the customers want and offer them that in the best way possible, improving customer experience.

- Create flow efficiency