

# Implementing Lean Manufacturing in the National Carton Industry Company

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# Outline

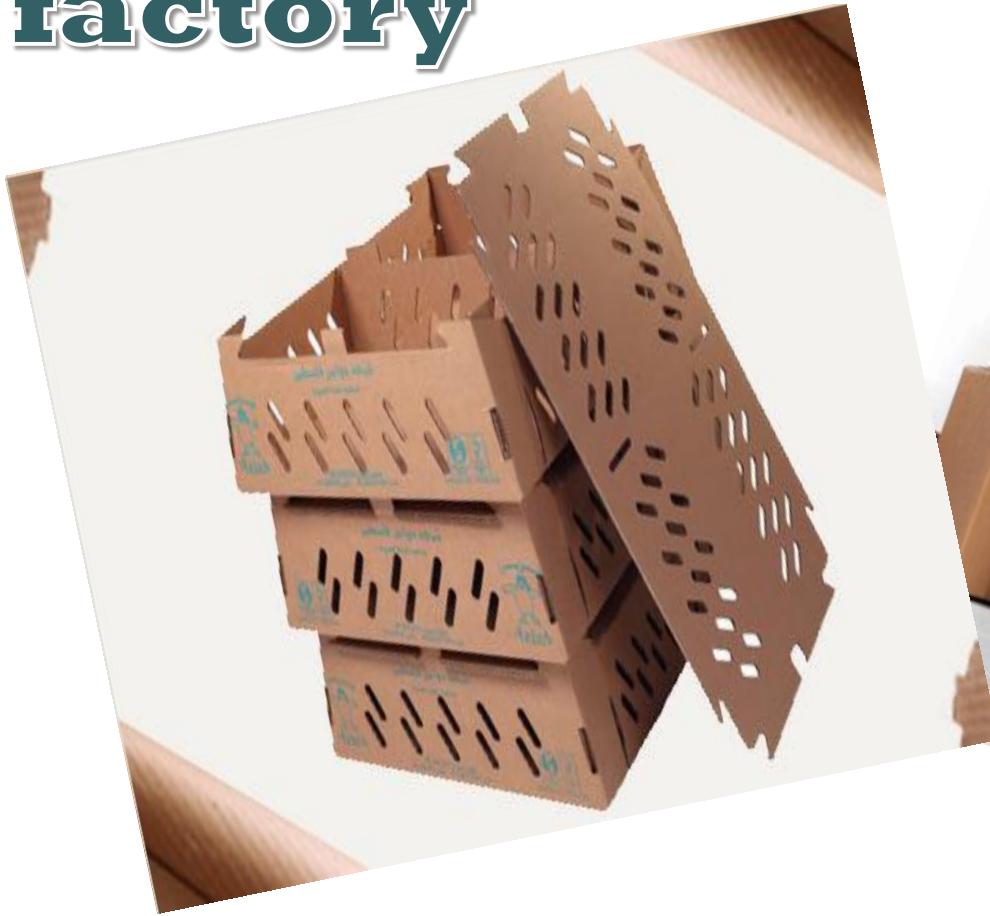
- Introduction
- Problem statement
- Objectives
- Literature Review
- Methodology
- Conclusion and Recommendations
- Questions

# **Introduction**

## **National Carton Industry Company**

- The National Carton Industry Company has established since 1989, located in Nablus-Palestine.
- It is manufacturing different kinds of packing cartons such as closed and opened, plain and printed.
- The supplement of Palestinian market with national products which meets the needs of economic sectors
- Using the highest standards of quality.

# Type of product in carton factory



Open carton boxes



Close carton boxes

# Problem statement

The National carton industry company has different problems with inventory that have a low space, safety and lead time between operations resulted from not having effective material handling system that leads to the delay of the production process and poor facility layout.

Another problem that the company has that the order need along waiting time to take that lead to late the arrival the order to customer.

# Lean manufacturing

- Lean manufacturing or lean production is a systemic method for the elimination of waste ("Muda") within a manufacturing process. It focuses on elimination non-value added activities and the efficiency of the overall system.
- A lean system can produce higher quality product, in lower quantities, with less committed inventory, with shorter lead time, at lower costs

# Objectives

- The main goal of this project is to **develop a theoretical lean thinking framework for implementing lean tools in the carton industry company** to reduce inventory, minimize the lead time, remove non-added value activities and improve the factory layout.
- To help the managers to understand the ways in which different lean principles may be incorporated into the production process.

# Data Gathering

To collect the data needed at this project, we visit  
The factory several time and met production manager to  
production and provide us with such information as  
quality data we were able to see how the machines  
operate and we were able to acquire time data, Visiting  
the factories in person gave our team valuable data  
which includes how the factory operates on a regular  
ideas for finding areas fit for basis and gave us many  
improvement



# Methodology

**Literature Review**

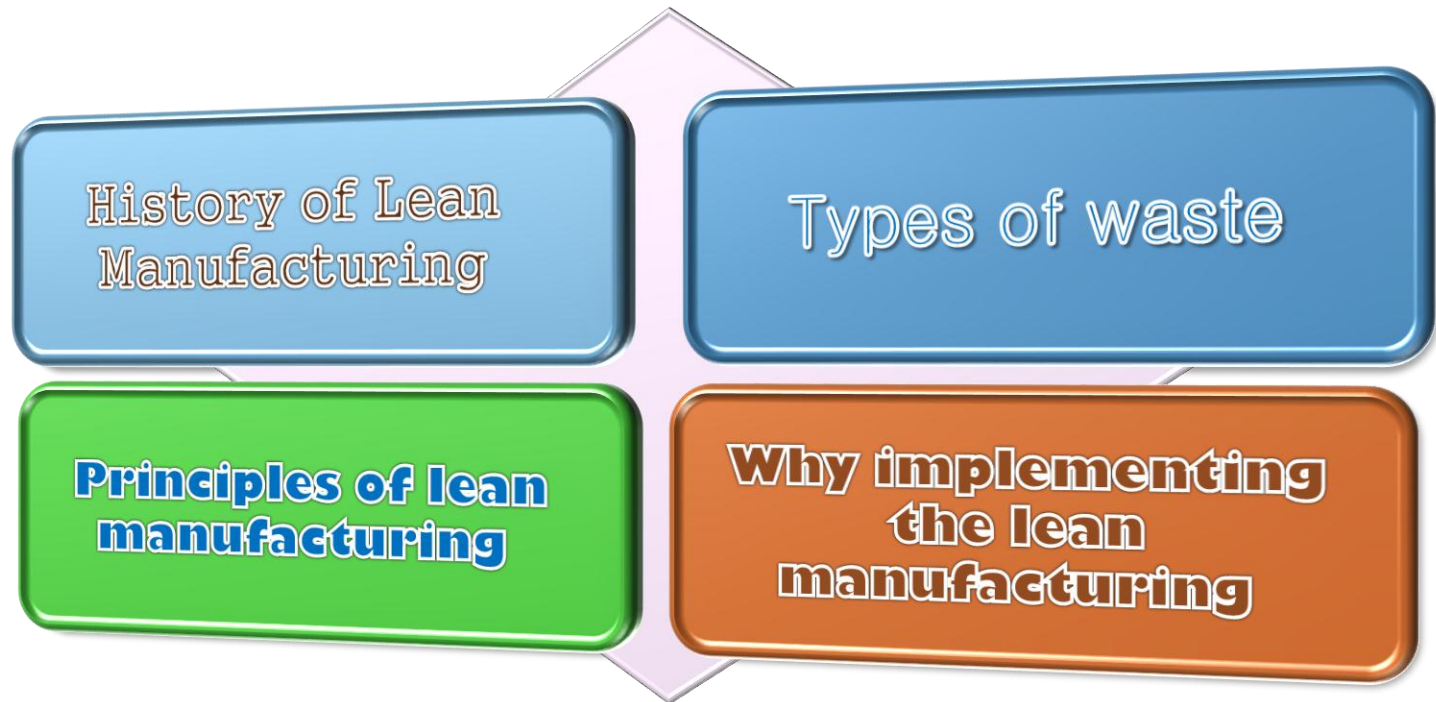


**Data Analysis**



**Fish bone diagram, VSM**

# Literature Review

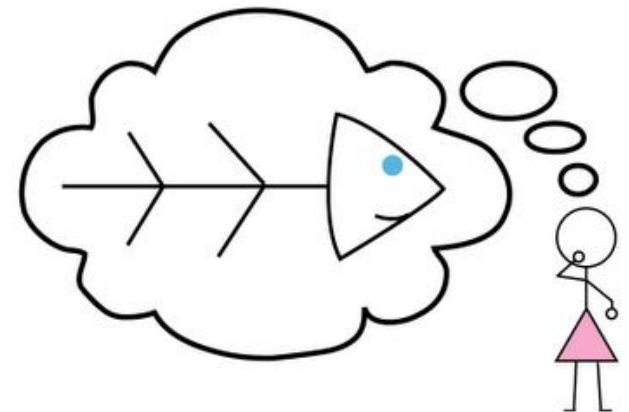


# Fish bone diagram, VSM

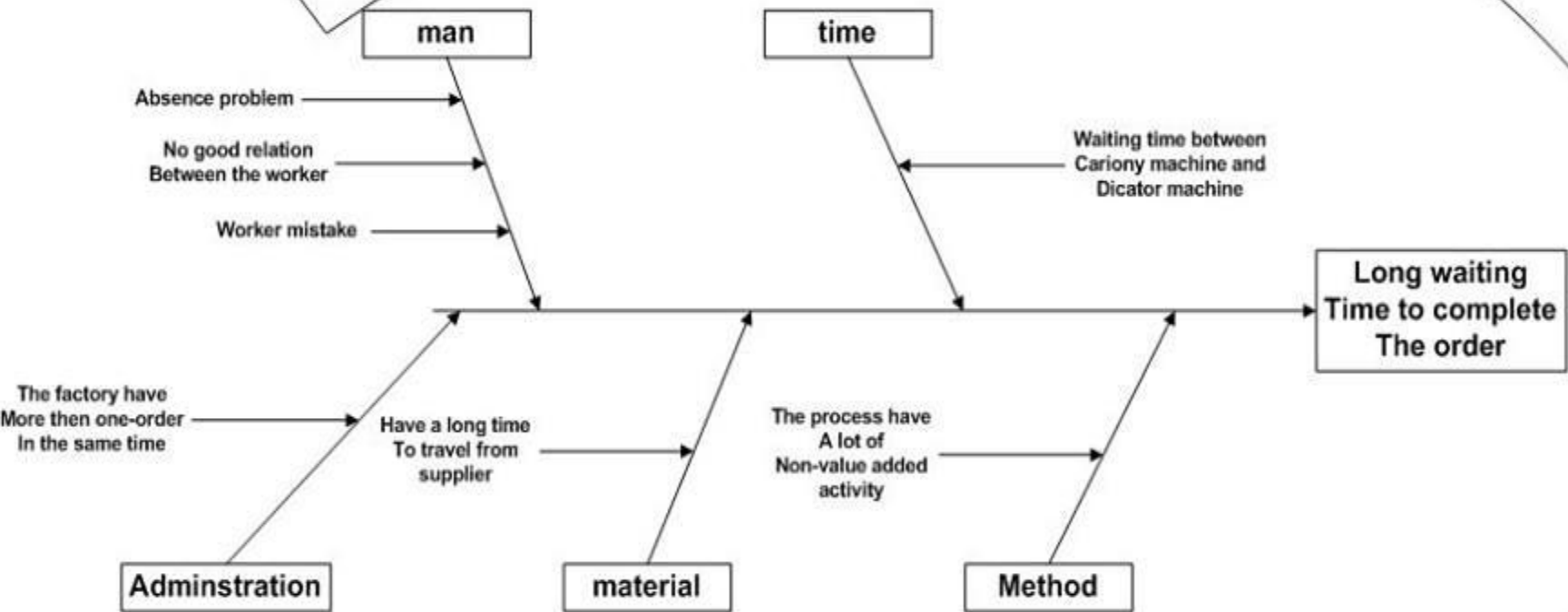
- Identify the project opportunity and understand about what needs to be changed in the company
- Collect the relevant data to support the proposed research; all major steps and activities must be identified
- Use different lean tools to determines variables relationships and understand different sources of waste
- Develop the theoretical framework for implementing lean thinking in the carton industry company.

# Fish bone diagram Tool

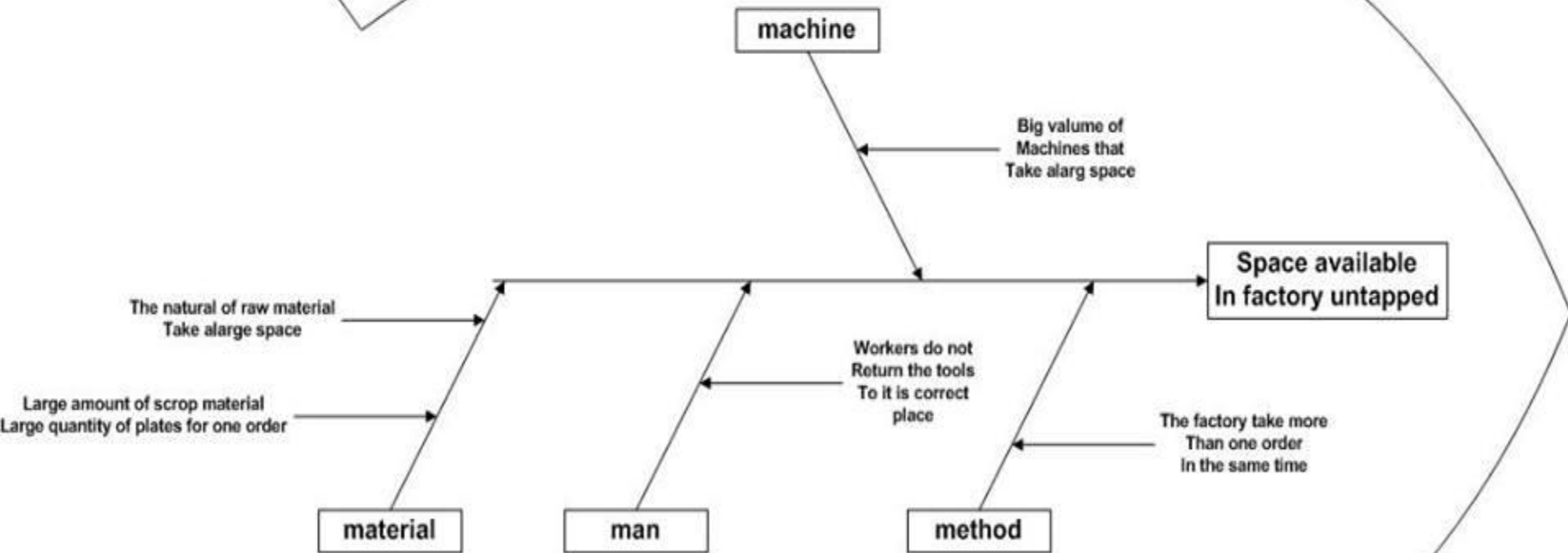
- A fishbone diagram, also called a cause and effect diagram or Ishikawa diagram, is a visualization tool for categorizing the potential causes of a problem in order to identify its roots cause.
- Categories the causes of the work:
  - \* methods
  - \* machine
  - \* people
  - \* inventory
  - \* waiting



# fish bone diagram for long waiting time



# Fish bone diagram for space available



# Value stream mapping methodology

- Value stream mapping, a lean manufacturing tool, which originated from the TPS, is known as “material and information flow mapping.” This mapping tool uses the
- Techniques of lean manufacturing to analyze and evaluate certain work processes in manufacturing operation.
- This tool is used primarily to identify, demonstrate and decrease waste, as well as create flow in the manufacturing process.

According to visited factory we notes that it has a lot of problem such as :

***Defect :***

- defect in RM according to its transfer ways.
- defect during production process because of many reasons on the carione machine(for change dimension carton require ) witch cause defect in case .
- defect in print on plate by carion machine .



## *Motion :*

- workers motion during production process which is presented for interring plate to carion machine moving plate to Dictator machine .
- workers motion in order to bring machine spare parts from maintenance department (in case failure).
- workers motion inside store in order to store the plate and arrange the final product.

## *Over production:*

- Produce huge quantity to avoid long set up time from type to another.
- Produce huge quantity for Coca Cola Company until reaches to require stock.

## *Transportation:*

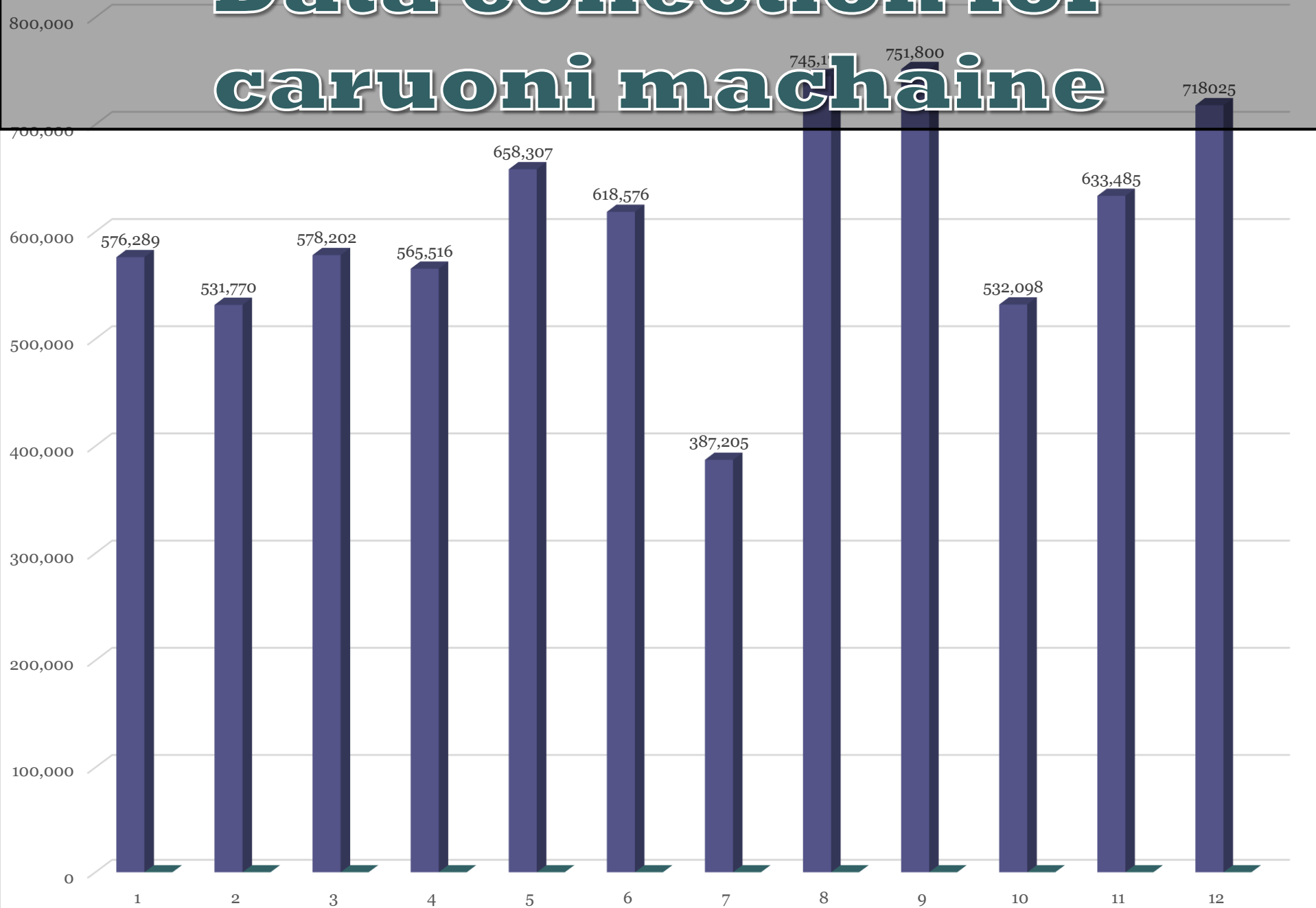
- worker's motion in order to move finished goods to the store .

## *Wattling :*

- Waiting for production line to the Dicater machine.
- Loss time of machine set up time during cleaning machines and calibration.
- Less time for cleaning the type of the products.
- Waiting time on the Dicater because the Carion is slower than Dicater .
- Waiting time of the packaging line.
- Waiting time for check up the quality of RM.
- Row material is waiting for looking for suitable place in store.
- Row material are waiting because there is no means to handle it (forklift)

# Data collection for caruoni machine

Quantities in red production (slab)



# The quantities produced (slab)



■ Series1 ■ Series2

# Deviation from the production quantities

## quantity

1200%

1000%

800%

600%

400%

200%

0%

76%

81%

89%

83%

80%

76%

73%

71%

70%

75%

72%

73%

1

2

3

4

5

6

7

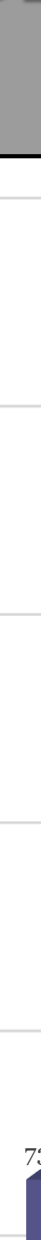
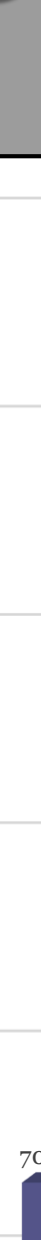
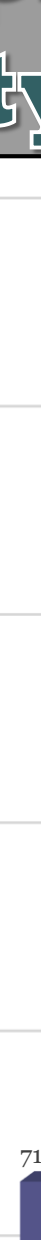
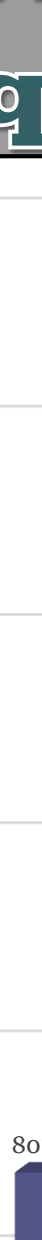
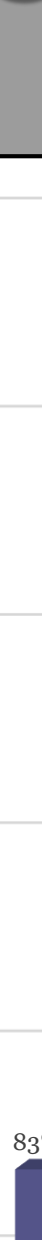
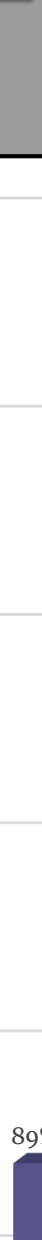
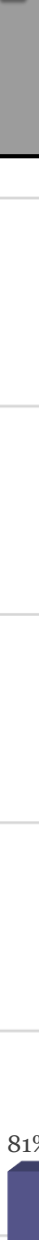
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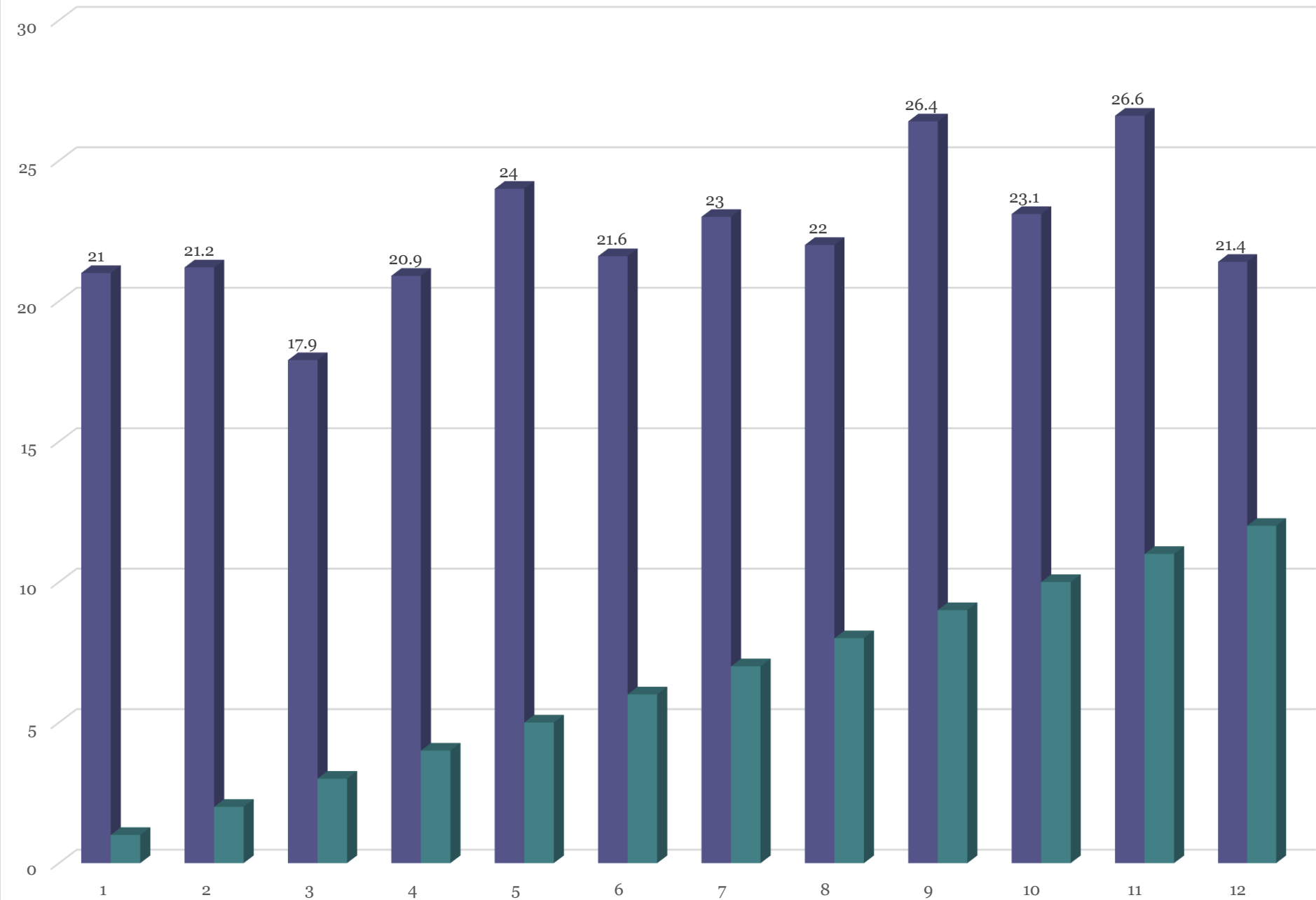
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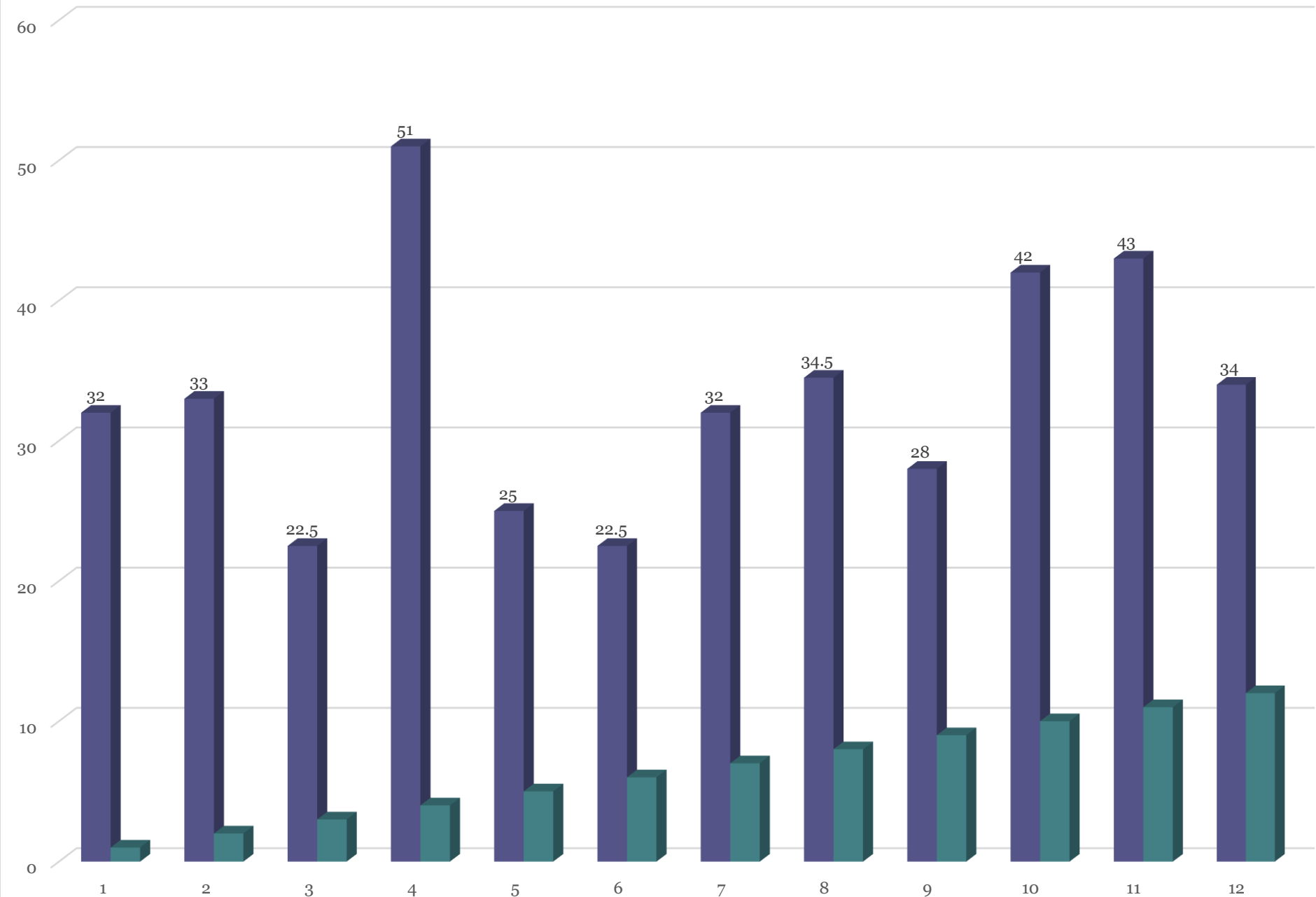
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# Calibration rate expectations

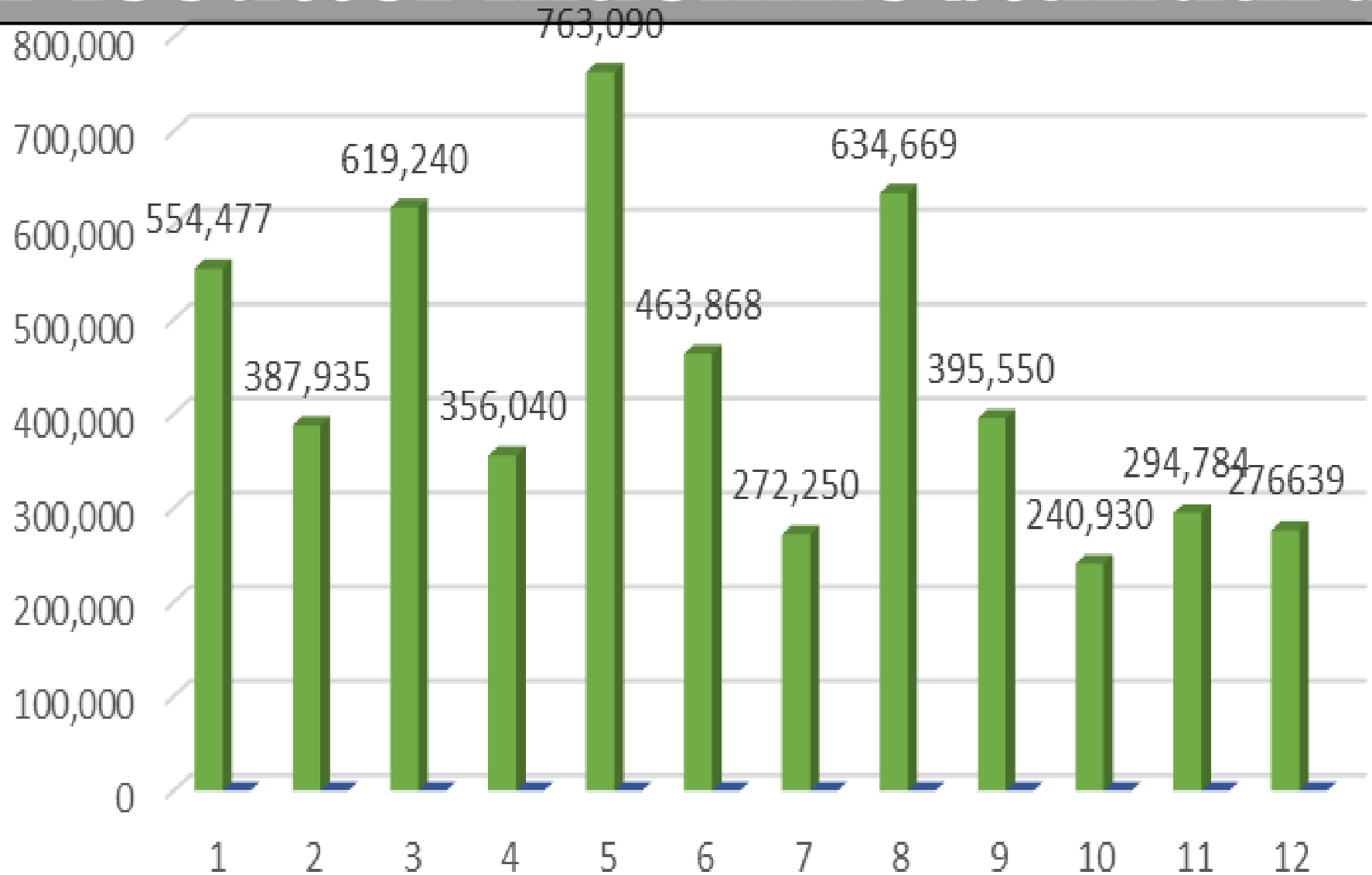


# Stops maintenance rate

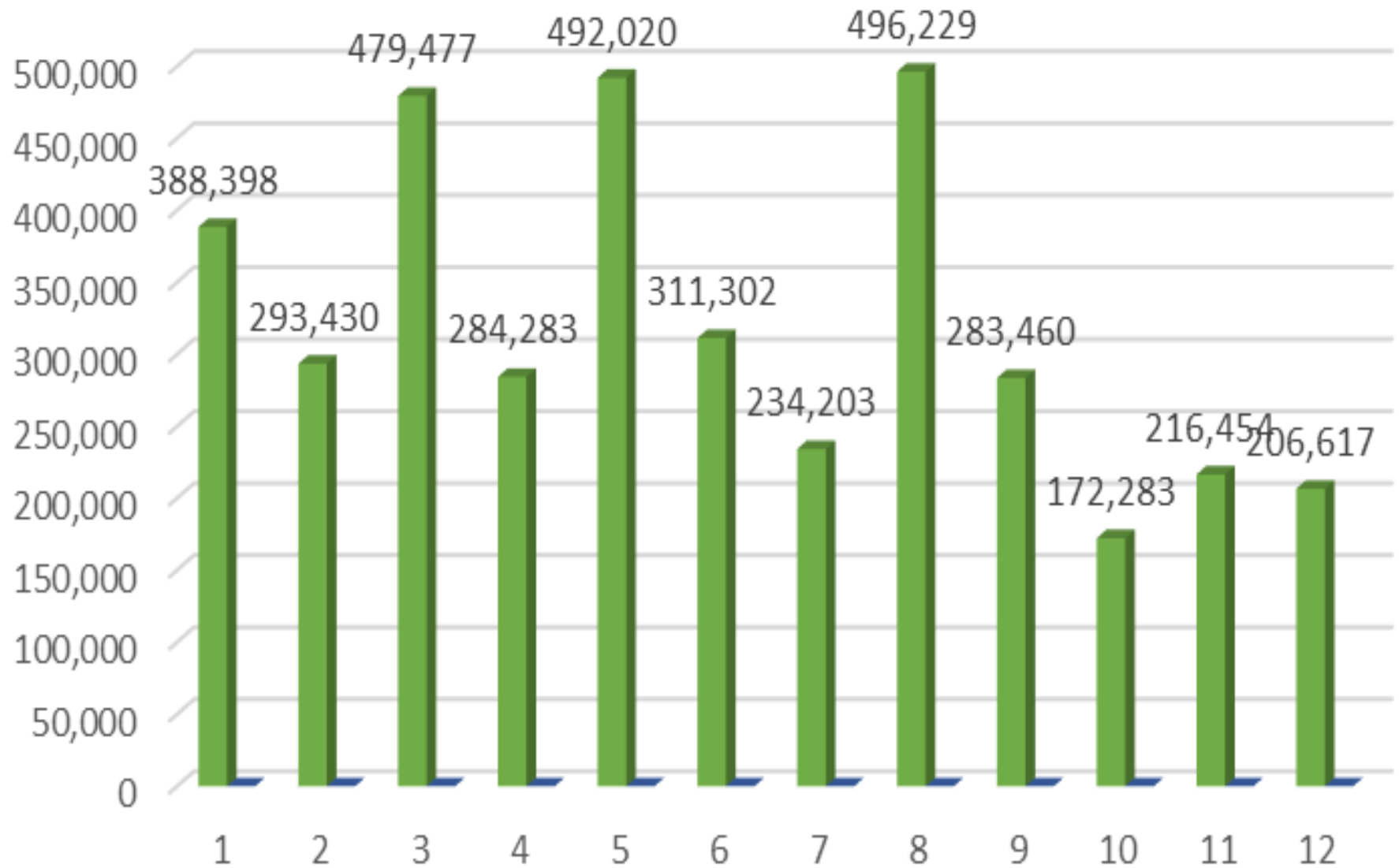




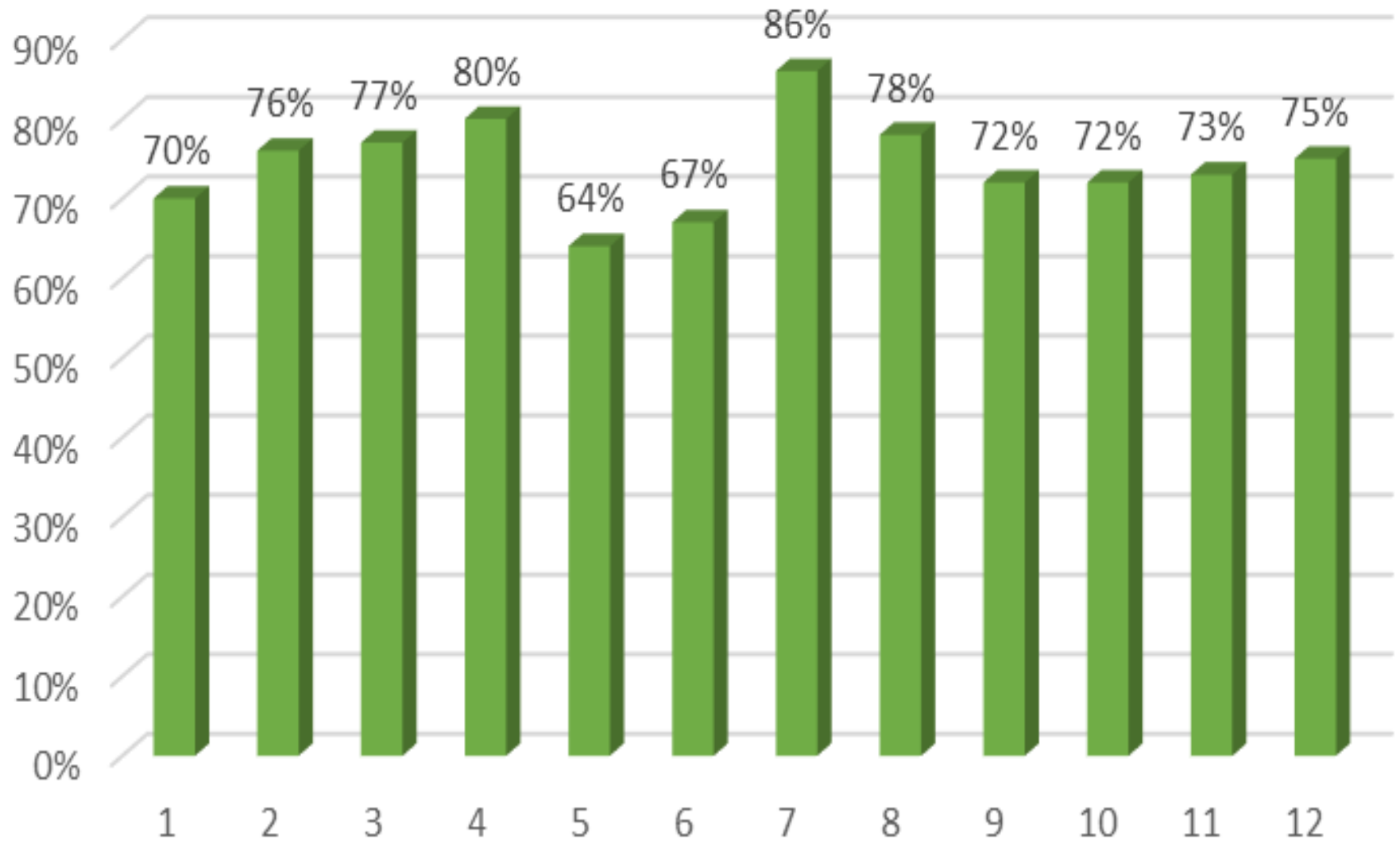
# Measure the performance of Diecutter machine standard



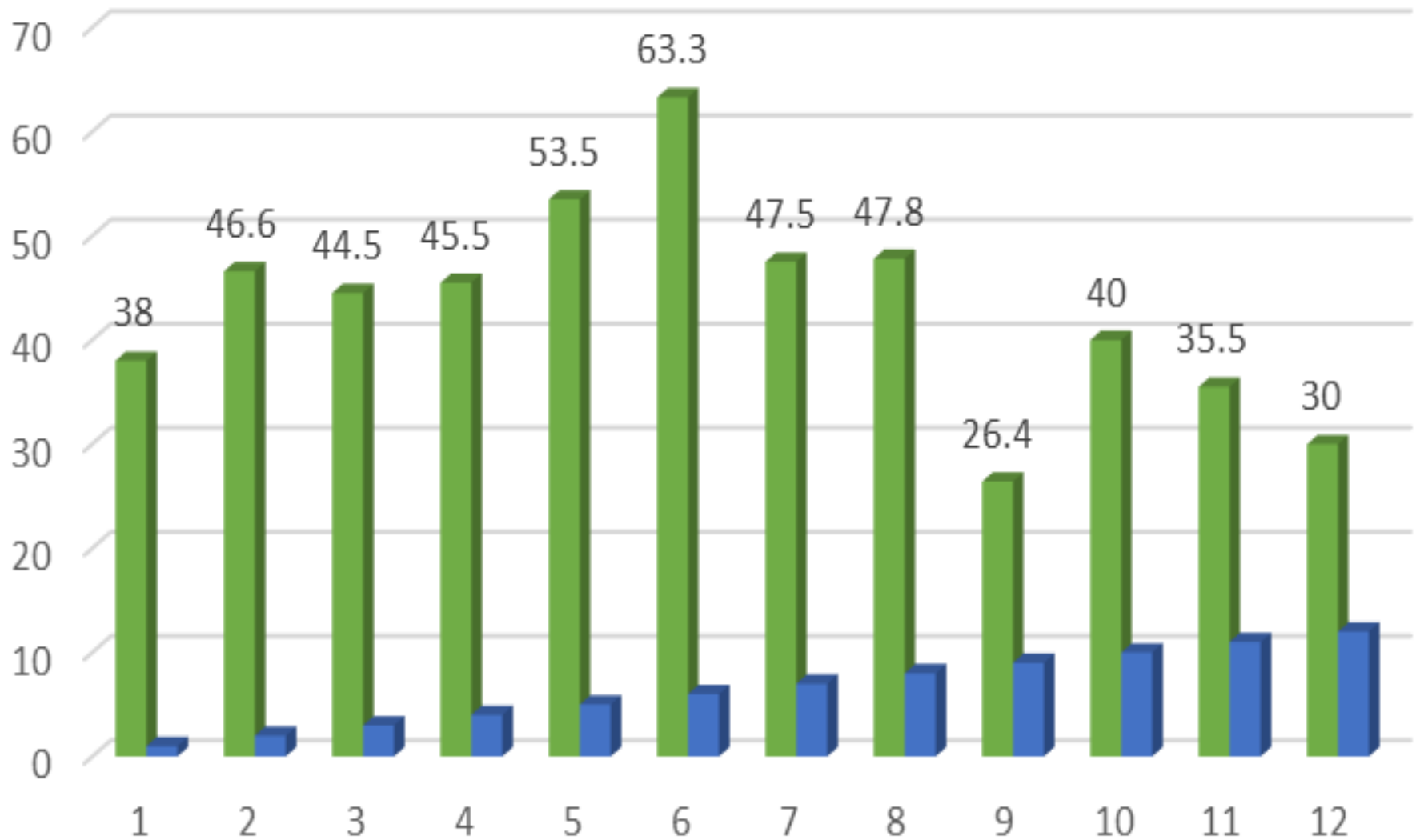
## The quantities produced (slab)



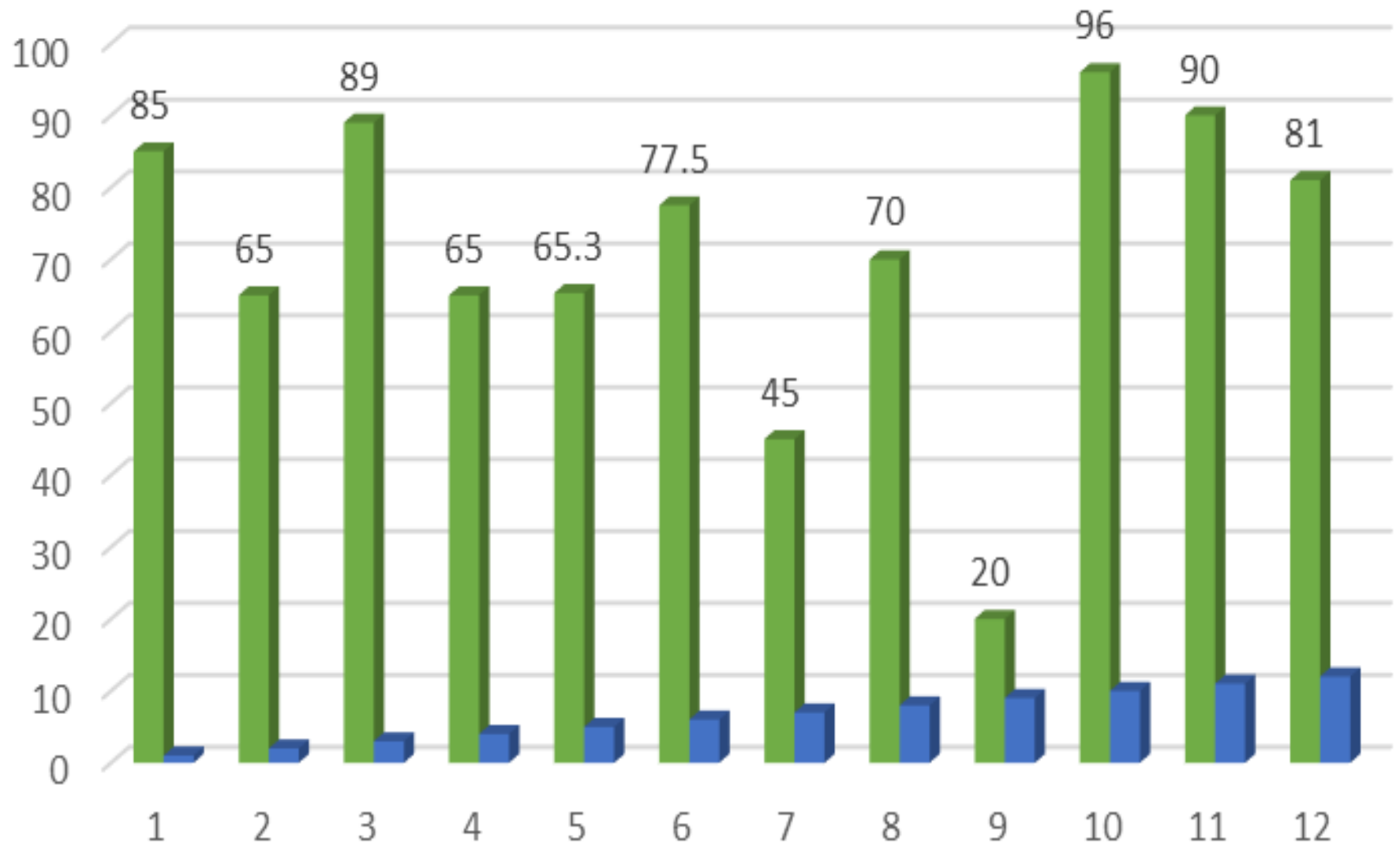
## Deviation from the target





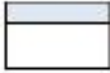















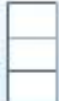

## Calibration gifted rate



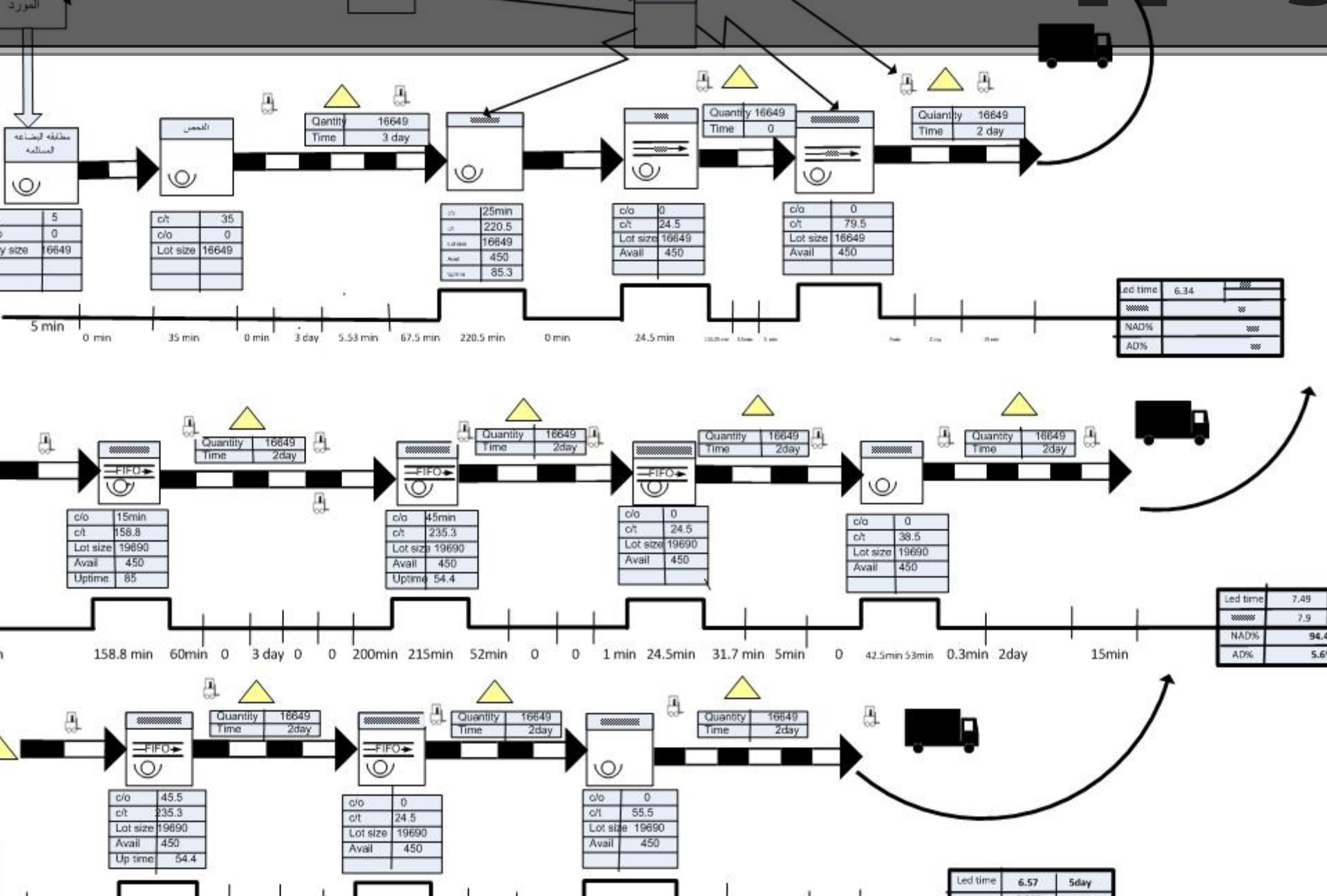
## Maintenance stoppages rate



# Value Stream Mapping Symbols

 <p>Supplier/ customer</p>	 <p>Data box</p>	 <p>Process box</p>	 <p>Time Line</p>	 <p>Time line ends</p>
 <p>Electronic flow arrow</p>	 <p>Manual flow arrow</p>	 <p>Push arrow</p>	 <p>Shipment arrow</p>	 <p>Logistics</p>
 <p>Kanban</p>	 <p>Improvement</p>	 <p>First In First Out</p>	 <p>Load Leveling system</p>	 <p>Batch Kanban</p>
 <p>Withdrawal Kanban</p>	 <p>Production Kanban</p>	 <p>Inventory</p>	 <p>Safety Stock</p>	 <p>Sequenced pull</p>

# Current Value stream mapping



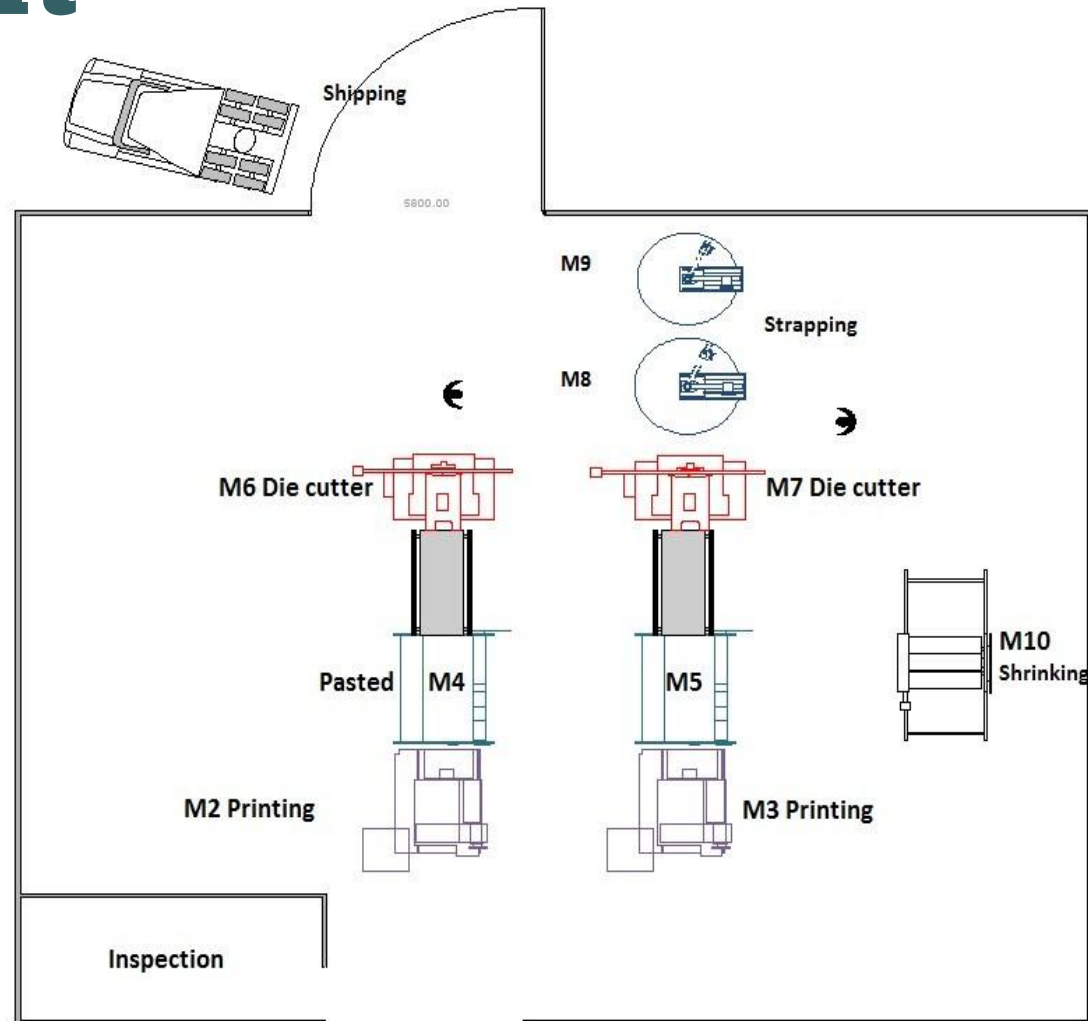
# plant layout

- Plant layout is a mechanism which involves knowledge of the space requirements for the facilities and also involves their proper arrangement so that continuous and steady movement of the production cycle takes place.
- Moore, a very well-known name in the business world, explained plant layout as, "The plan of or the act of planning, an optimum arrangement of facilities, including personnel, operating equipment, storage space, materials handling equipment and all other supporting services along with the design of the best structure to accommodate these facilities".

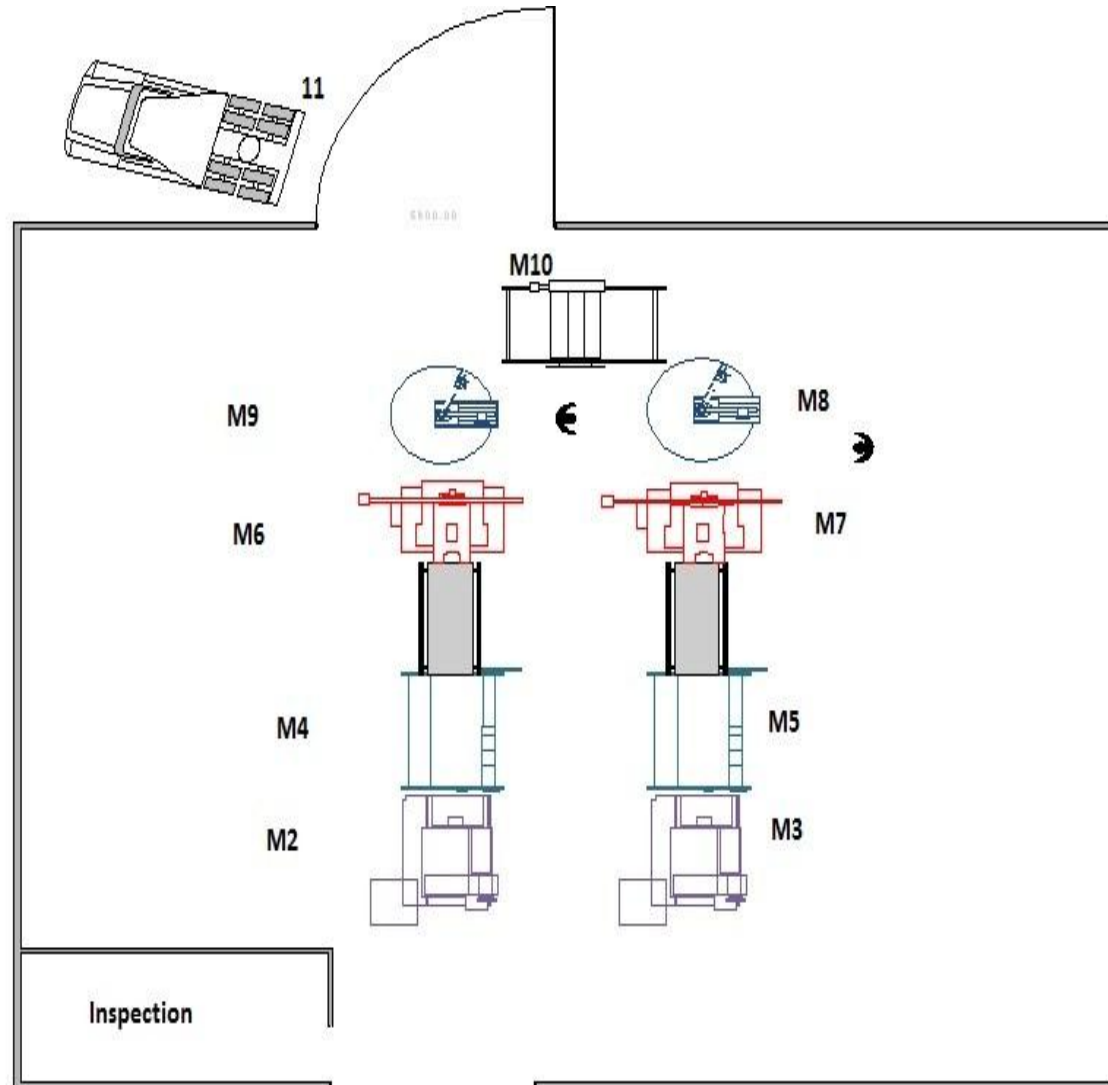


# Layout evaluation and improvement

- By making the layout evaluation for the current location by using the distance based scoring between all machines we reach to
- Current layout layout



- suggestion of new layout
- By sense we thought that if we change the position of M9 & M10 the cost will minimize, because they take a long distance to reach them, so the new layout will be like :



# Recommendation

## Proposal and solution for reducing waste in production area:

- Document procedures which ensure continuous preventive maintenance includes all production lines.

## Developing workers program of

- Modifying workers training program.
- Specify the responsibilities of each workers .
- Employing more workers if needed

- Reformulation for contract with RM supplier to ensure have better quality for RM .
- Reschedule for production plans to keep up with demand.
- Set instruction to ensure workers commitment.
- Commitment to safety factors during forklift Movement .

# Improvement current layout

- The plant layout needs an improvement in order to minimize the cost and the distance between machines.
- The plant have a large area and they need a good facility layout to utilize it in a good way.
- They can use the large spaces and open a new production line.

THANK  
YOU