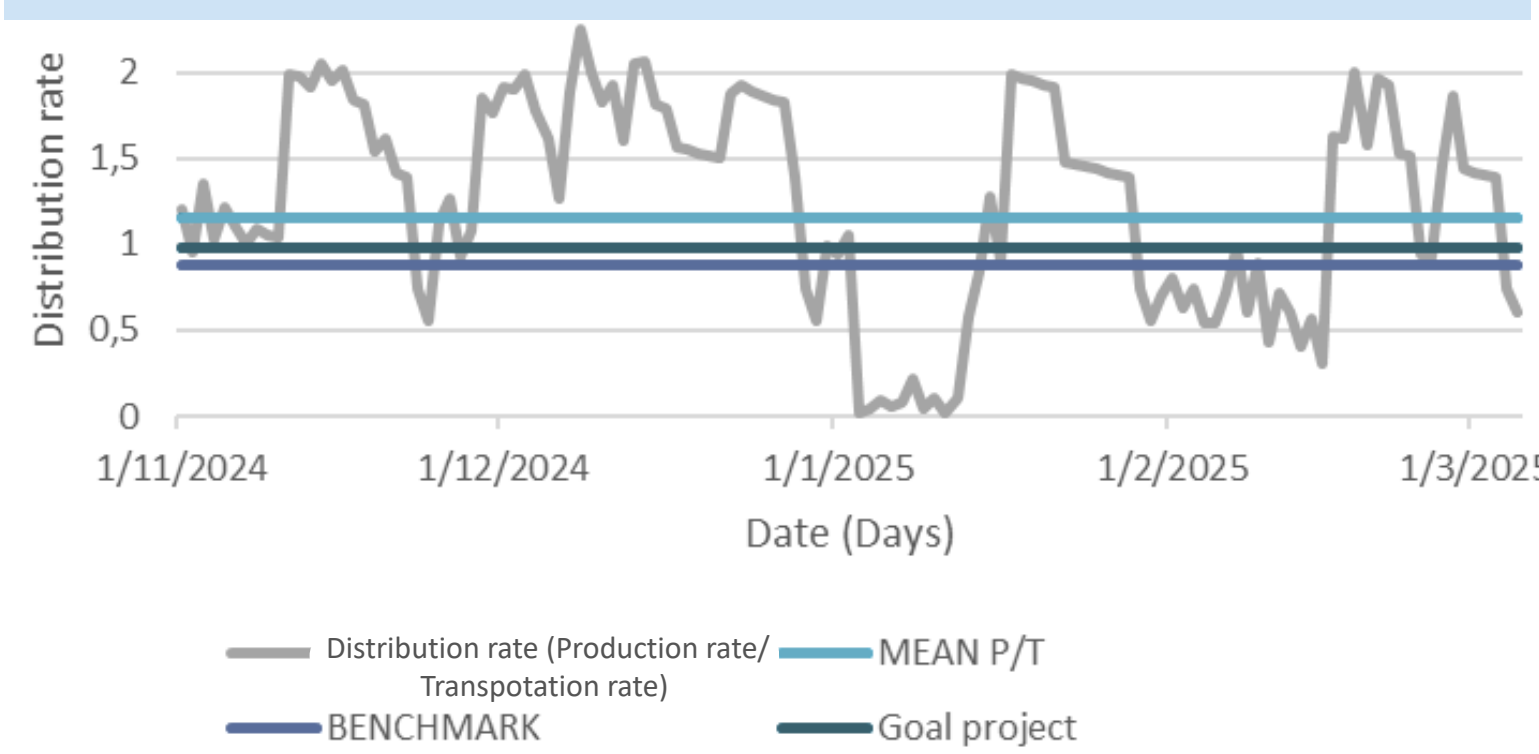


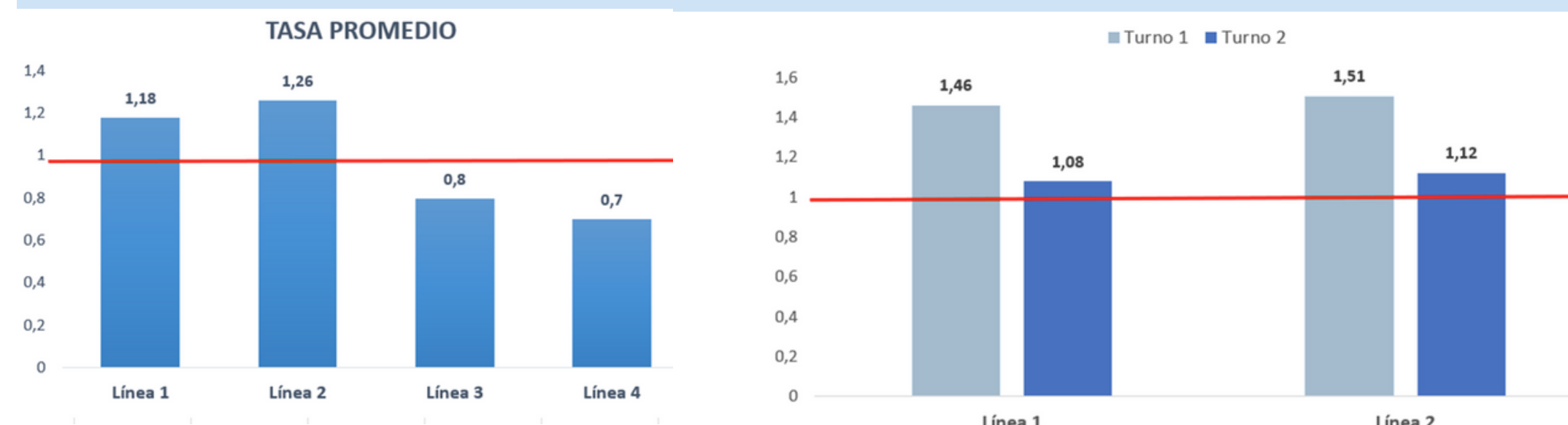
During shift 1, bottlenecks occur due to the accumulation at the production outputs of lines 1 and 2, due to an insufficient distribution rate ($Y=1.20$). This situation affects the operational efficiency of production, internal logistics, and oversight.

Reduce the distribution rate by 15% in lines 1 and 2 from the final production process to the warehouse by implementing logistical and operational improvements.

Time series of the distribution rate (Y)



It was stratified by lines and shifts, identifying that Line 1 and 2 in Shift 1 concentrate the problem.

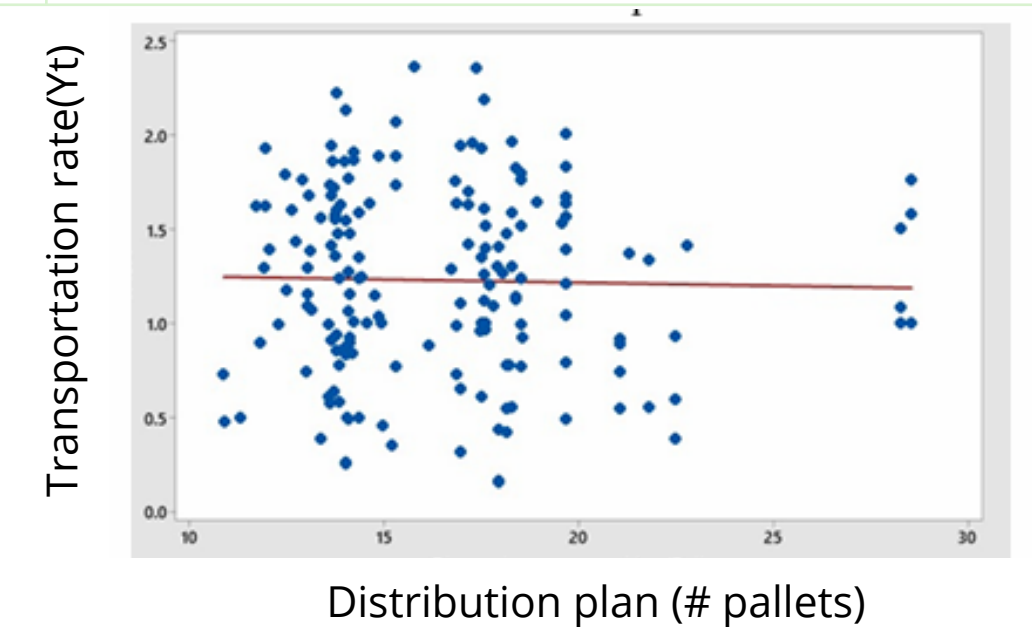
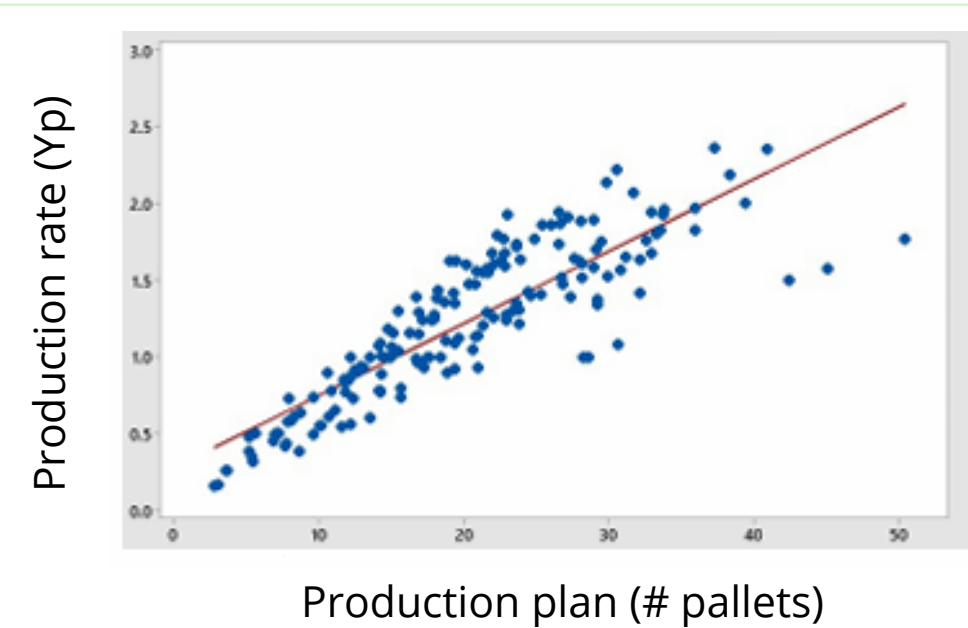


Stability analysis: Stable process without out-of-control points.

Six potential causes were evaluated and, through the cause-effect matrix, x2 and x3 were prioritized. After, the capability and correlation analysis, X3 was identified as the root cause.

X2. The production plan for shift 1 starts without checking the available space in the warehouse at the beginning of shift 1.

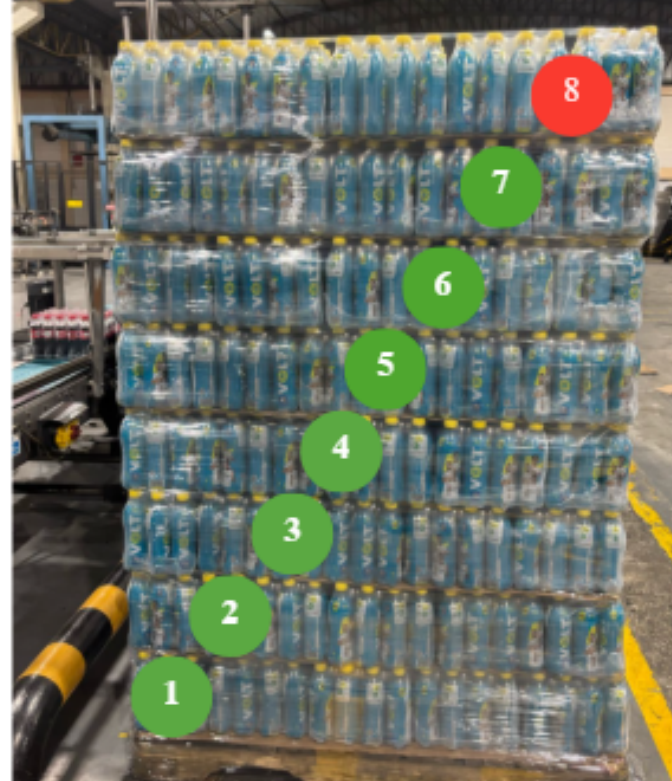
X3. The high-volume SKUs are stored in distant and scattered locations, which requires longer transit times.



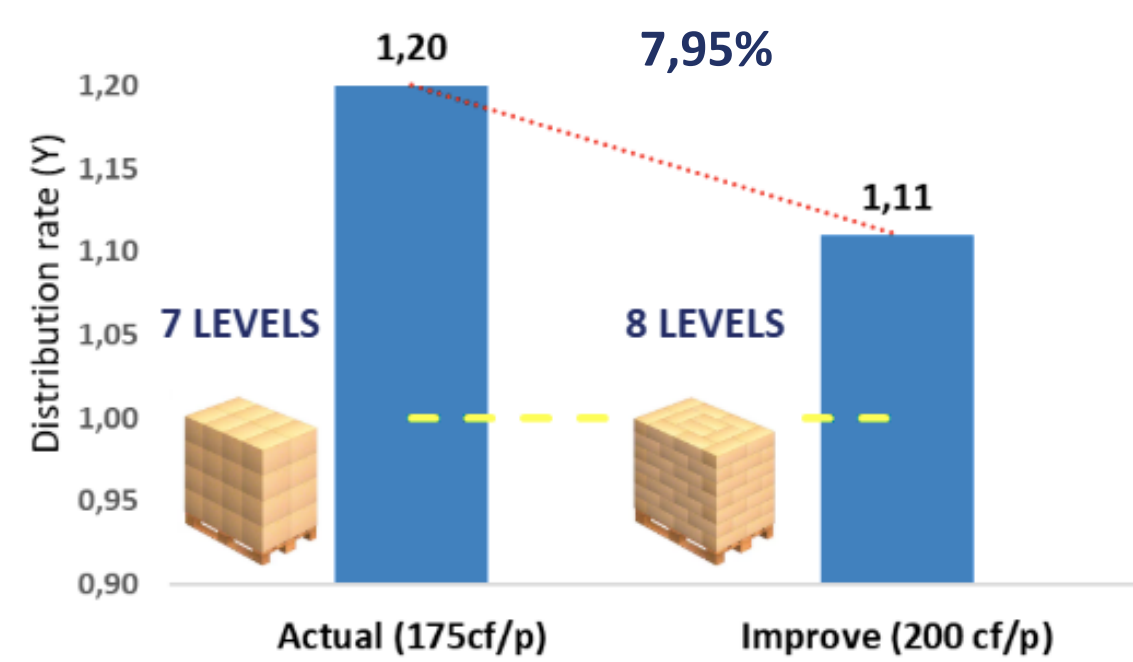
S1. Increase the weight/density of the pallet	S5. Increase the levels in the pre-shipment area
S2. Implement visual status panels of the process	S6. Implement shared KPIs between areas
S3. Update the procedures manual	S7. Route optimization from production to warehouses PT..
S4. Improve coordination between areas	8. Apply lean Six Sigma (5s)
S9. Establish buffer zones	

A scatter plot with 'IMPACT' on the vertical axis and 'EFFORT' on the horizontal axis. The vertical axis has 'LOW' at the bottom and 'HIGH' at the top. The horizontal axis has 'LOW' on the left and 'HIGH' on the right. There are eight data points labeled S1 through S9. Points S1, S5, and S7 are red circles, indicating high impact. Points S2, S3, S4, S6, S8, and S9 are blue circles, indicating low impact. S1 is at the top right (high effort, high impact). S5 and S7 are in the upper left (low effort, high impact). S2 is in the middle right (high effort, low impact). S4, S6, S8, and S9 are clustered in the lower left (low effort, low impact).

ACTION 1. Increase the density of the 400 ml energy drink pallet.



By increasing 25 physical boxes per pallet, the distribution rate decreases to 1.11.

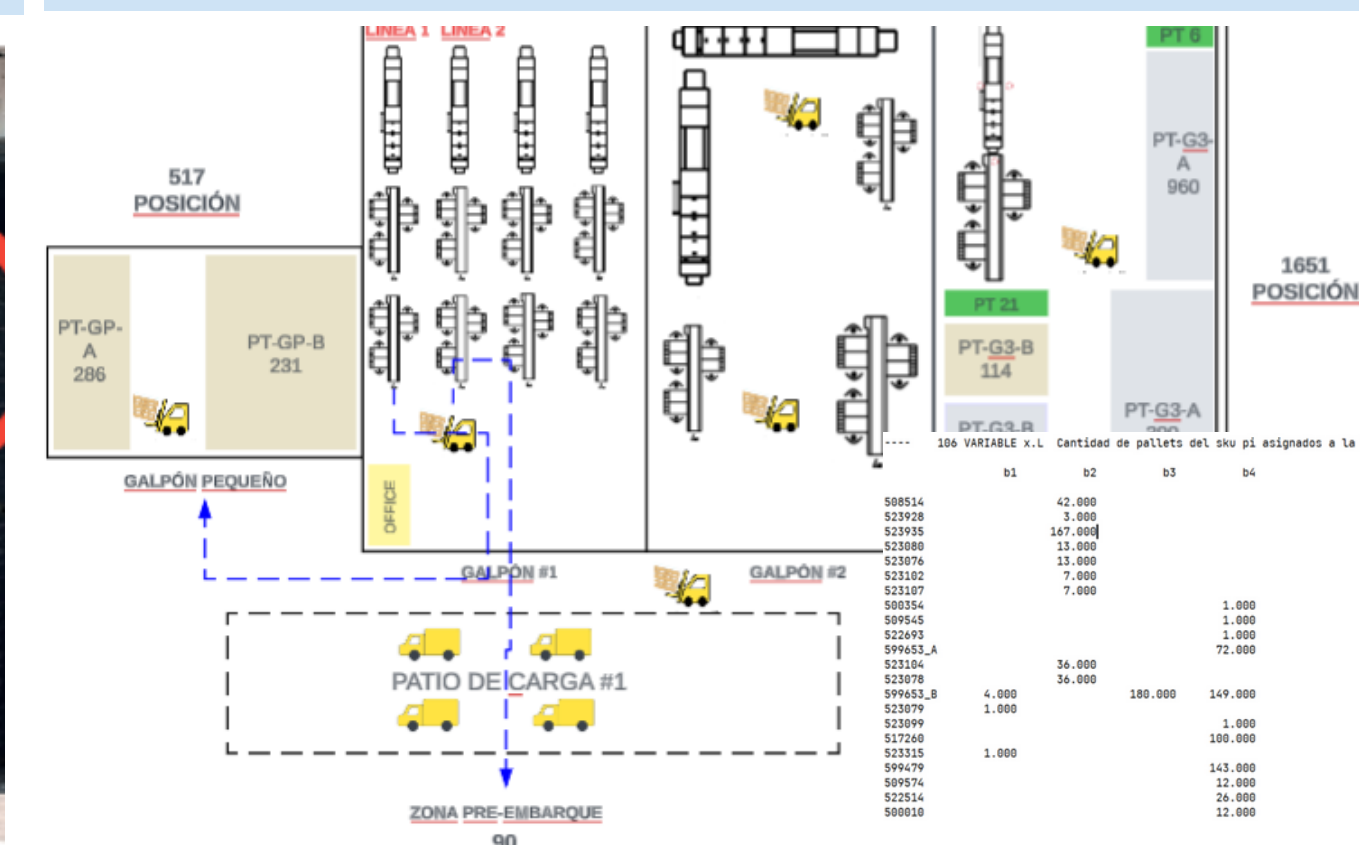


ACTION 2. Increase the capacity of the pre-shipment warehouse (formats 300ml - 400ml)

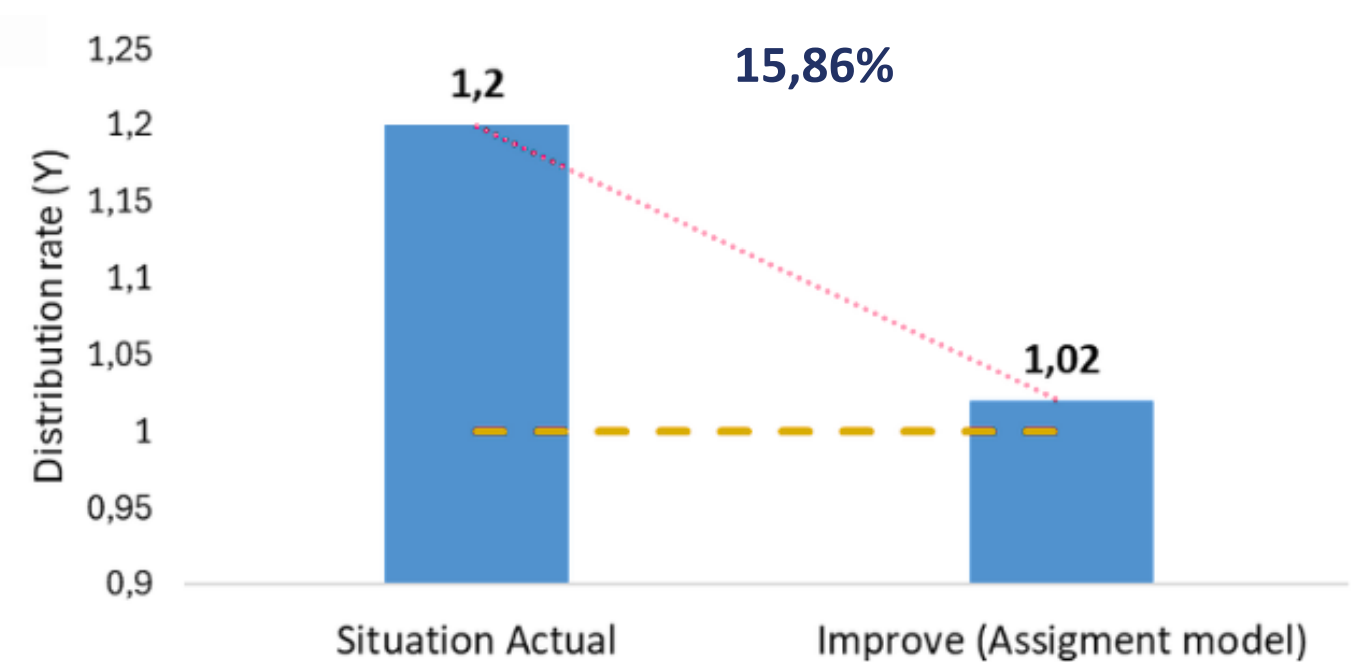
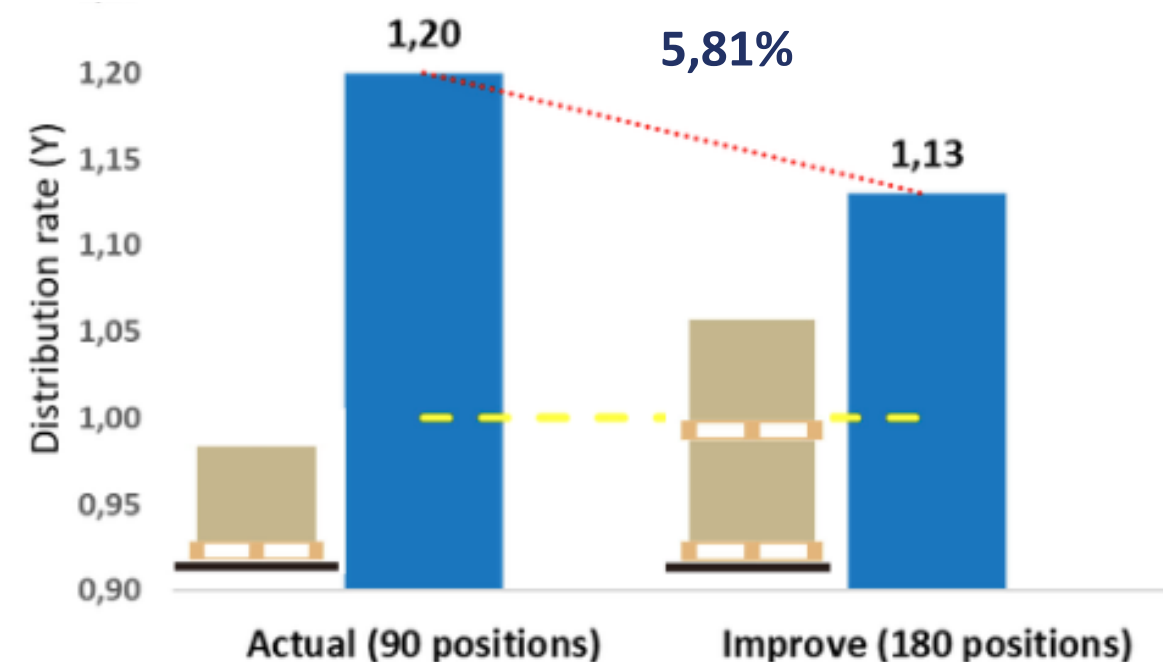


By stacking the pallets one on top of the other, the distribution rate is reduced to 1.13.

ACTION 3. Route optimization from production to warehouse PT - GAMS



By establishing ABC according to the results of the allocation model, the distribution rate was reduced to 1.02.



Triple bottom line

Financial

-15% costs of \$\$
hour/man due to
line inactivity

Social

+12% Efficiency
of the forklift
operators

Environmental

-33%
consumption of
water, energy,
and waste

CONCLUSIONS

SOLUTIONS	WHAT DOES IT CONTROL?	WHO CONTROLS?	WHY IS IT CONTROLLED?	HOW DOES IT CONTROL?	FREQUENCY	CONTINUOUS IMPROVEMENT
Increase the density of the pallet	Increase the number of boxes per pallet for 400 ml energy drinks.	Production supervisor, quality analyst	Fewer unnecessary movements = less wear and tear on equipment.	Checklist review by the quality department. Meetings with	Monthly	Quality tests and audits in both internal and external warehouses
Stacking in the pre-shipping area	Add stacking levels in the pre-embarkation area	Warehouse coordinator and quality analyst	Prevent accidents due to collapse or unstable stacking.	Review of pallet status Inventory rotation control (FIFO/FEFO)	Weekly, monthly	Monthly feedback from warehouse managers
Route optimization from production to BPT	Locations to the different warehouses through ABC categorization	Warehouse coordinator	Goals can be set, results compared, and strategies adjusted.	Recording downtime due to lack of flow. Review of indicators	Daily motorization	Create dashboards for reporting to all areas.

As a result of the DMAIC methodology, three strategic actions were implemented that generated significant impacts, including: The configuration of the 400ml energy drinks was redesigned, increasing the density from 175 to 200 physical boxes and increasing the height from 7 to 8 beds, which reduced transit times by 7.95%. The pre-shipment warehouse capacity was doubled from 90 pallets to 180 pallets, thereby reducing the distribution rate by 5.81% by stacking one pallet on top of another. The consolidation of both previous improvements, along with the implementation of the mathematical logistics allocation model, resulted in a 15.86% reduction in the distribution rate and a cumulative capacity of 22 pallets per day. This variation varies according to the production plan.