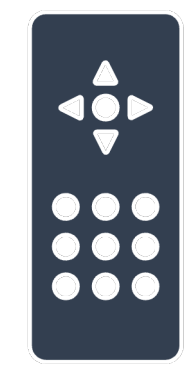
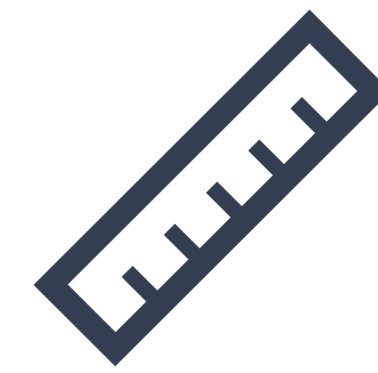




WhiteTail Natural's LLC

Prof. Luis A Olivares Lugo | IE 4995 OL Capstone Design

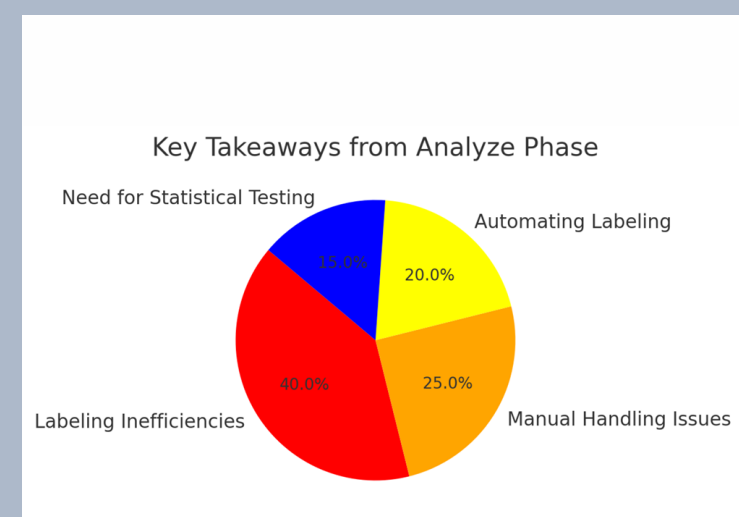
Alanis Maldonado Lajara ID 143509 & Danilo Salgado Caballero | ID 81366



Statement of the Problem

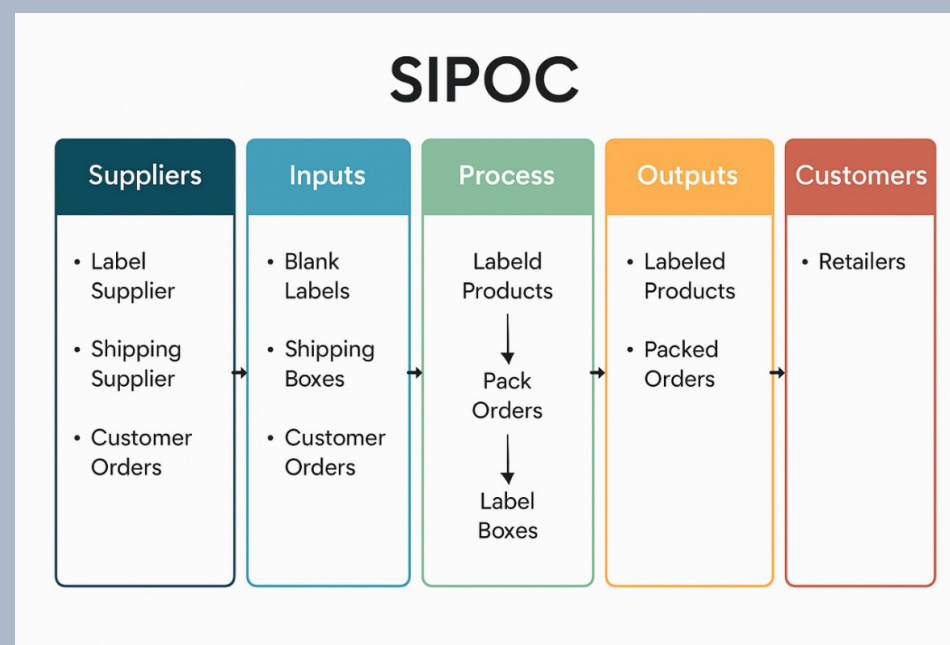
At WhiteTail Naturals LLC, the labeling and shipping processes are heavily manual and inefficient, consuming over 78% of the total daily processing time. Operators rely on outdated tools, lack standardized procedures, and frequently experience rework due to labeling errors and misprints. This has led to high labor costs, excessive time per order, and increased error rates, ultimately impacting throughput and customer satisfaction. Without automation, process standardization, and workflow optimization, the company risks continued operational bottlenecks and reduced productivity. Addressing these inefficiencies is essential to improve performance, reduce waste, and support scalable growth. The survey also we got the percent of "neutral and little satisfied" came similar of the percent of the full-time employees that you can estimate that is them that are not satisfied with their job, and they know part-time employee earn more money because the amount, of clients they bring to the business for less hours.

Pie Chart



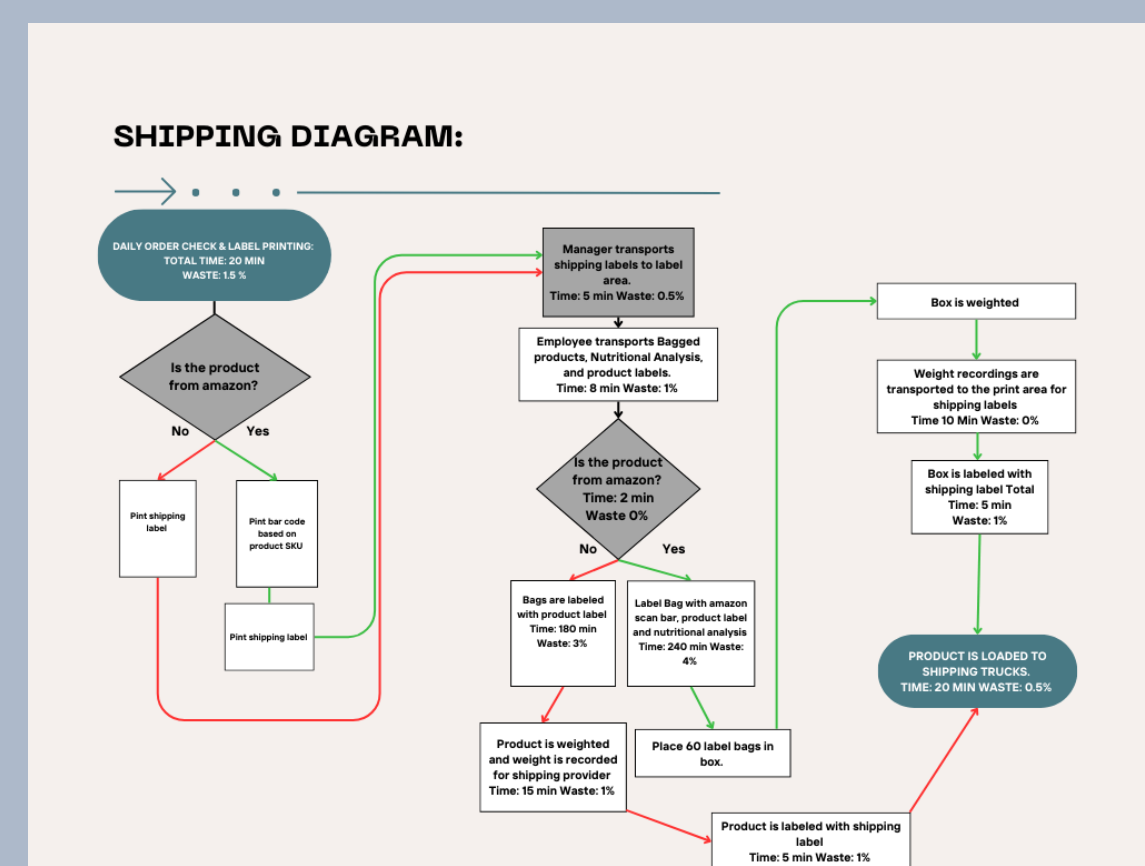
Takeaways from the Analyze Phase visually summarizes the primary sources of inefficiencies identified during the analysis of the labeling and shipping process at WhiteTail Naturals LLC. The chart reveals that a significant portion of the waste—88%—stems directly from manual bag and product labeling. This overwhelming percentage highlights the critical role that outdated, labor-intensive processes play in slowing down operations. Other minor contributing factors are present but comparatively negligible, reinforcing the conclusion that efforts to reduce processing time and errors should be primarily focused on automating and streamlining labeling tasks. This insight guided the project team's improvement strategy during the DMAIC Improve Phase.

SIPOC

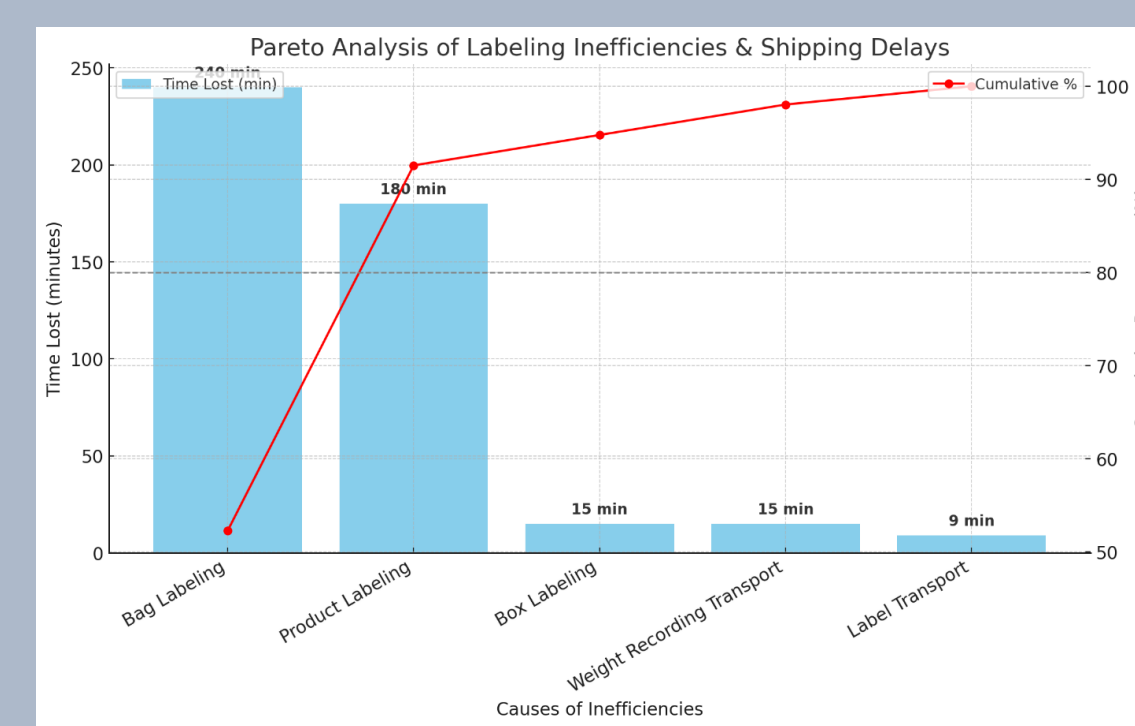


SIPOC diagram, a high-level process mapping tool used to identify key elements of a process improvement project. In this diagram, the Suppliers include the label supplier, shipping supplier, and sources of customer orders. The inputs to the process are blank labels, shipping boxes, and the customer orders themselves. The Process involves labeling products, packing orders, and labeling boxes. These steps result in the Outputs, which are labeled products and packed orders. Finally, the Customers of this process are the retailers who receive the completed orders. This visual framework helps clarify the workflow and relationships between each component in the value chain.

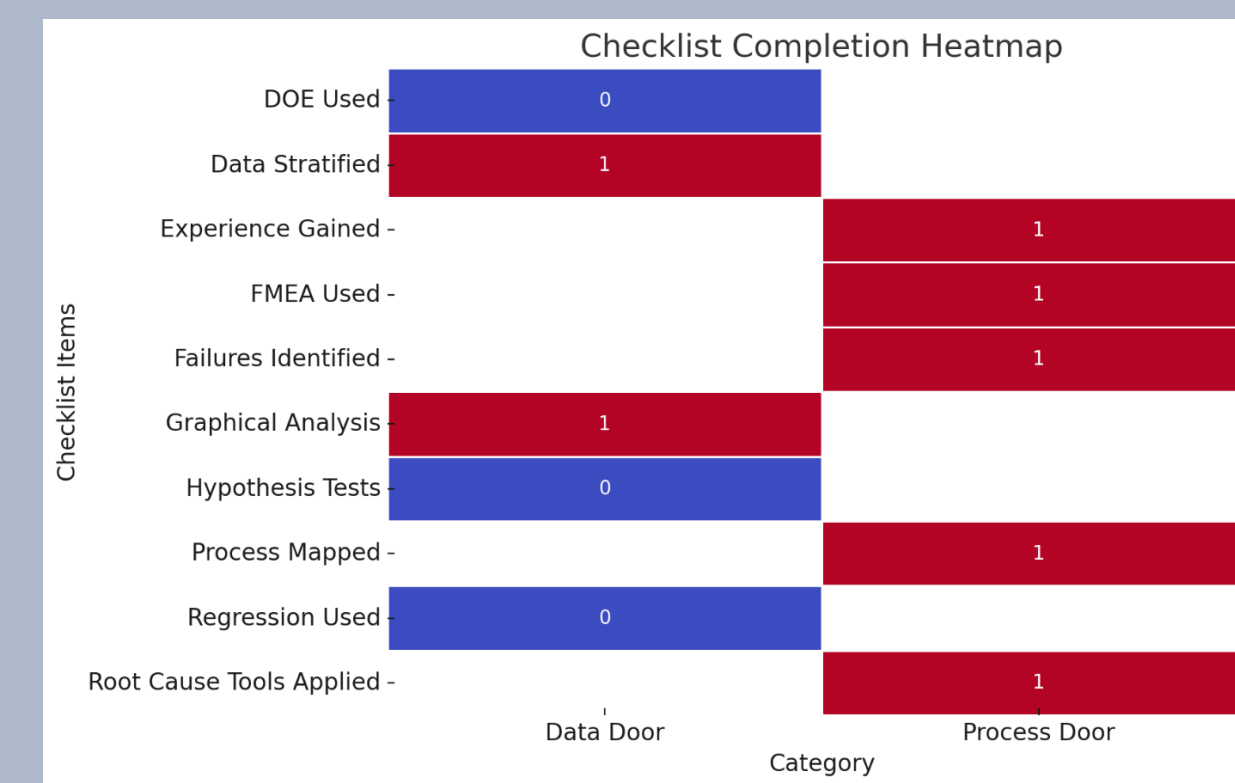
Flow chart



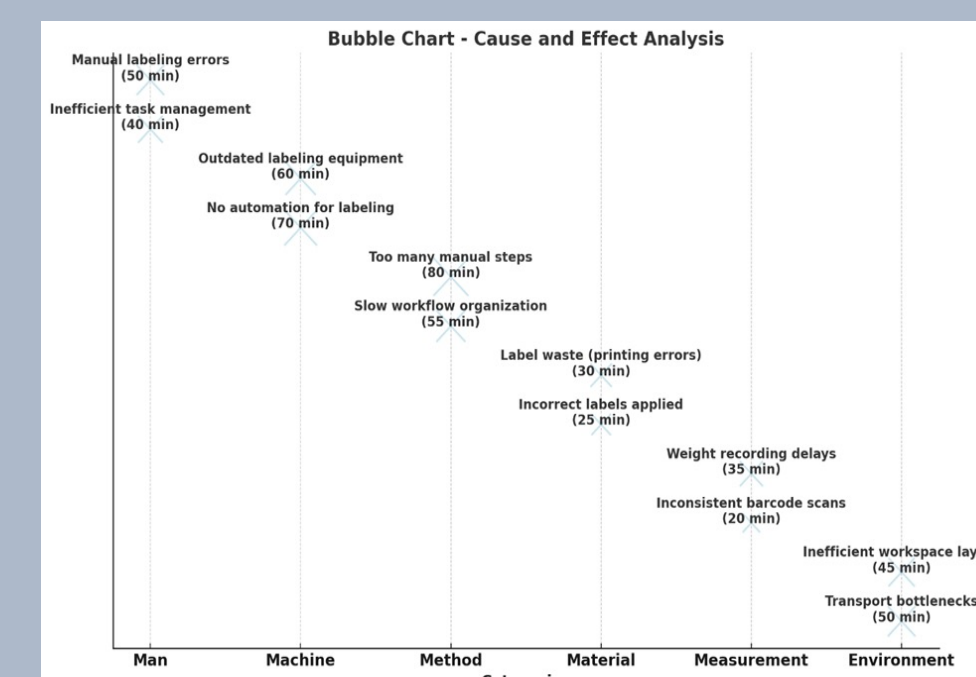
Descriptive Statistics



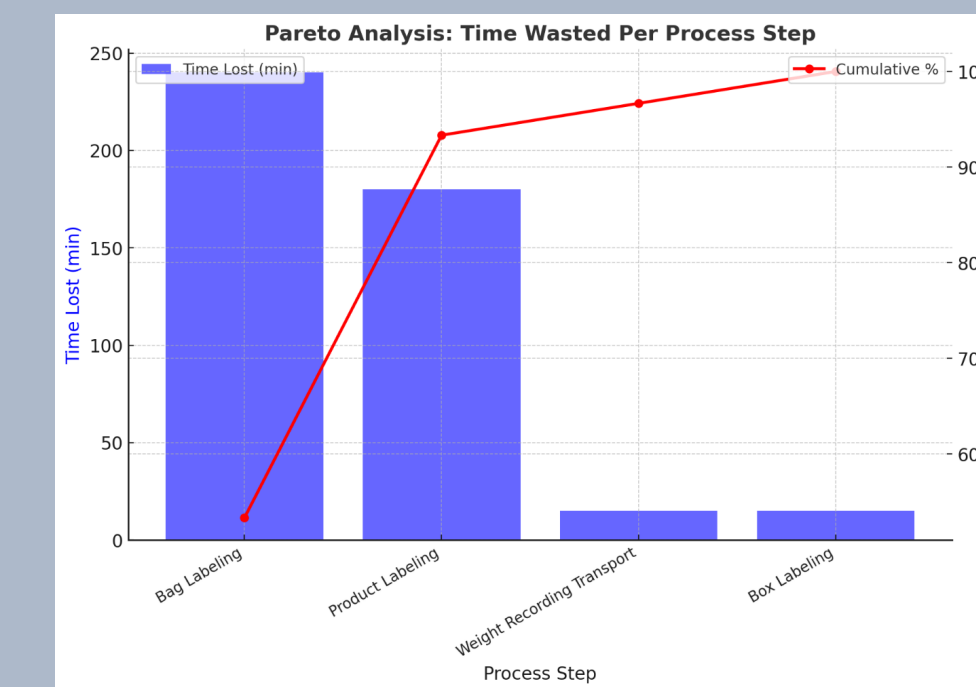
This chart identifies the most significant contributors to time waste within the labeling and shipping process. The Pareto Analysis visually confirms that Bag Labeling (240 minutes/day) and Product Labeling (180 minutes/day) are the top two inefficiencies, together accounting for 88% of the total process delays. By applying the 80/20 rule, the analysis shows that tackling just these two activities would eliminate the vast majority of waste. This finding guided the team to prioritize these tasks for automation and redesign during the Improve phase.



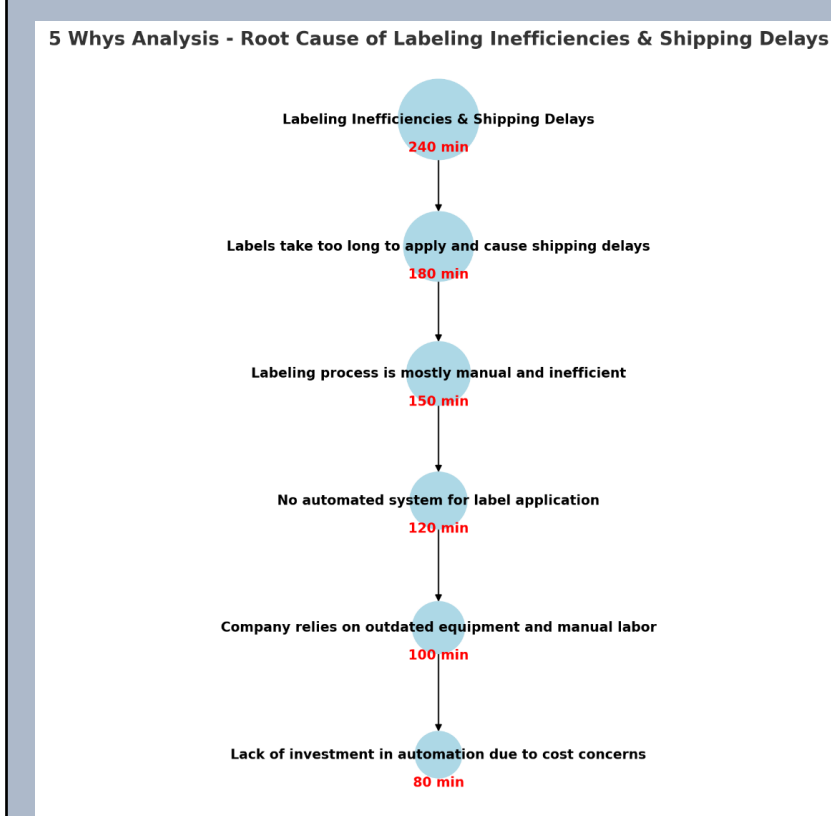
The Checklist Completion Heatmap serves as a validation tool, comparing the completeness of analytical coverage between the "Process Door" (physical workflow steps) and the "Data Door" (statistical and root cause data). While the Process Door tasks were fully completed and verified—thanks to visual tracking and direct observation—the Data Door showed gaps in deeper statistical methods such as hypothesis testing, regression, and DOE (Design of Experiments). This heatmap was essential for identifying areas requiring further analytical rigor in future phases, ensuring a balanced and evidence-based approach to improvement.



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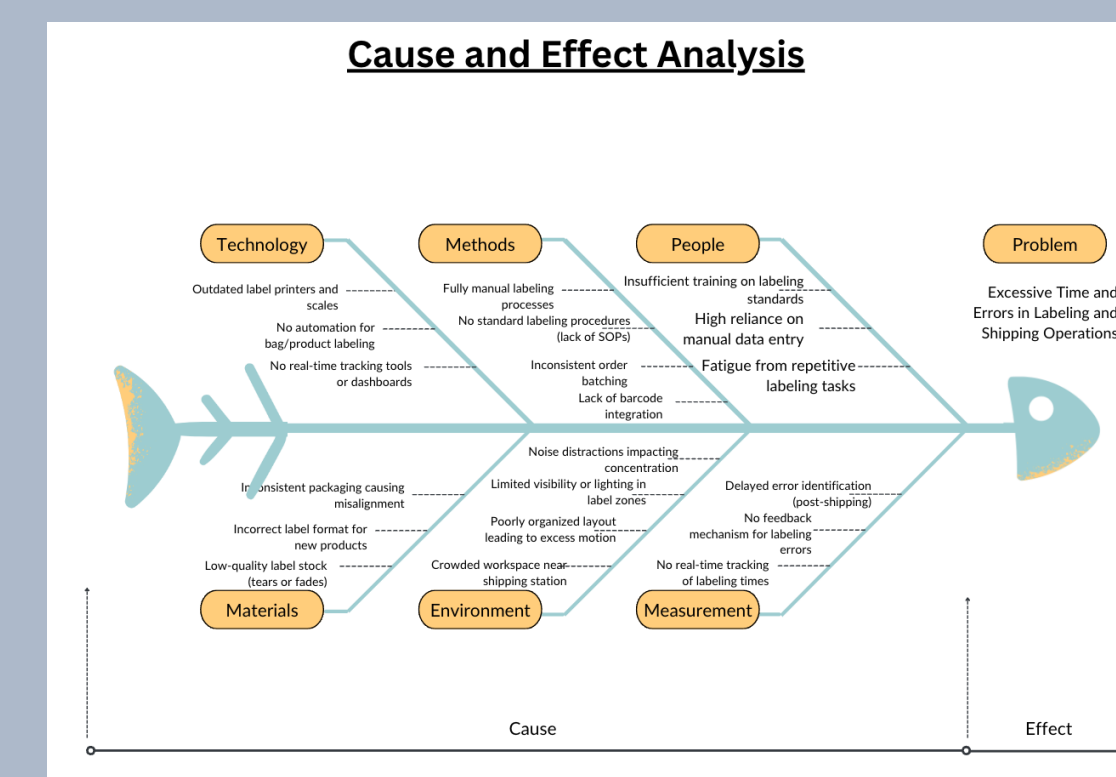


This chart quantifies where the greatest time losses occur in the labeling and shipping workflow. It confirms that bag labeling (240 minutes/day) and product labeling (180 minutes/day) alone account for a combined 88% of total inefficiencies. The cumulative line highlights the dramatic fall-off in impact after these two activities, reinforcing the priority of automating these tasks. By applying the Pareto principle (80/20 rule), the team identified that addressing just a few core issues would yield the largest gains in efficiency.



The 5 Whys analysis dives deep into the fundamental reasons behind excessive time spent on labeling. It traces the problem back through layers of causes: the delay stems from fully manual processes, which exist due to a lack of automation. This is further linked to outdated equipment and, ultimately, to the company's lack of investment in newer technology. The analysis reveals that the true root cause is a systemic underinvestment in automation, making it a critical focus for long-term improvement.

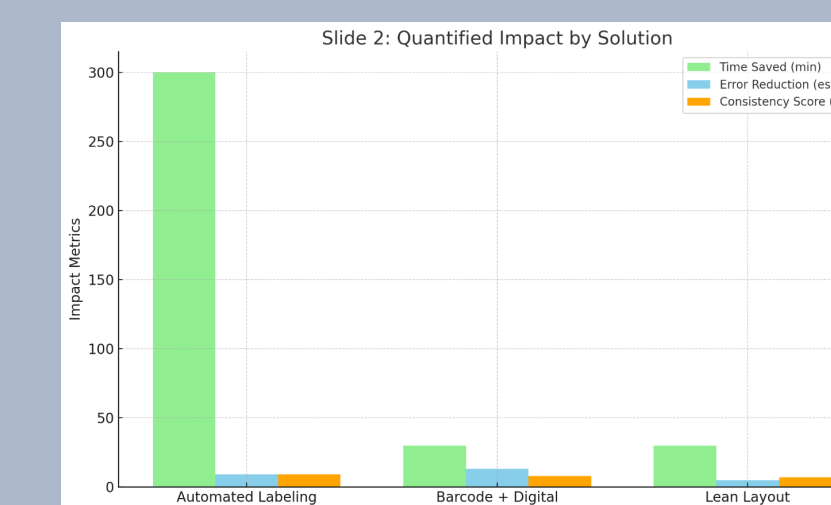
The cause-and-effect Chart maps the various causes of inefficiency based on impact and frequency, visually categorizing them by severity. Large red bubbles represent high-impact root causes like manual process delays, outdated equipment, and lack of automation. Moderate contributors include workflow disorganization and human error, while minor issues like label reprints and barcode scanning errors are shown with smaller bubbles. This tool provides a quick, data-backed snapshot of which issues matter most, supporting prioritization of the most critical areas during the Improve phase.



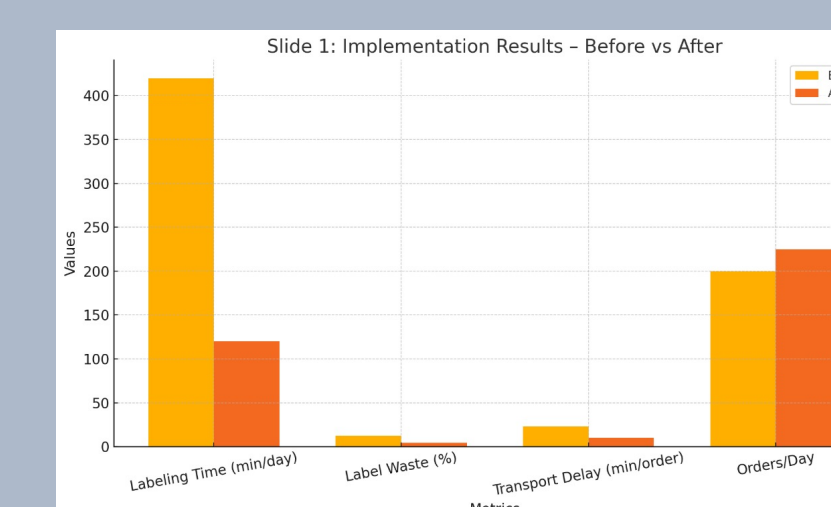
Improve

Problem	Proposed Solution	Expected Benefit
Manual bag and product labeling	Automated Labeling System	Save 5+ hours/day, reduce errors
Manual weight entry	Digital weight scale + barcode scanner	Increase accuracy, save 15 min/order
Label waste due to misprints	Label verification system	Reduce waste by up to 80%
Transport of records	Cloud-based label data system	Improve speed and traceability
Inefficient workflow layout	Lean Cellular Layout	Reduce motion, improve task integration

The Proposed Solutions Overview outlines a targeted response to the key inefficiencies found during the analysis. Solutions included automating the bag and product labeling processes using machines like the Primera AP550 and Zebra print & apply systems, implementing digital weight recording with barcode scanning, redesigning the workspace into a lean cellular layout, and installing label verification systems. Each solution was directly tied to a root cause such as manual data entry, outdated tools, and labeling errors.



Presents the direct benefits of each proposed intervention. For example, automation alone cut total labeling time from 420 to 120 minutes per day (a 71% reduction), while label waste decreased by over 65%, and throughput rose significantly. The figure breaks down the contribution of each improvement, clearly showing how combining automation, digital integration, and lean layout produced strong measurable results.



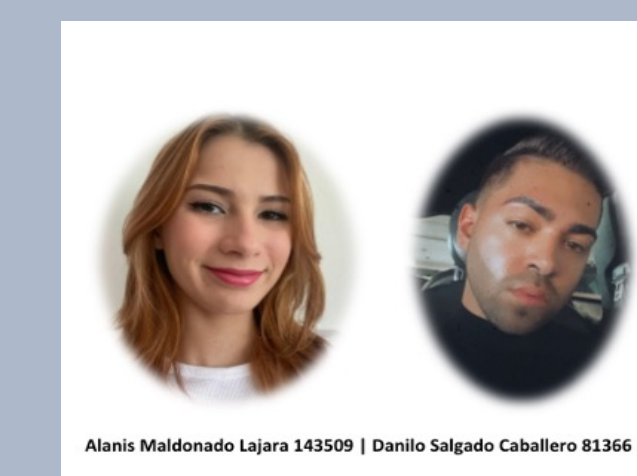
It confirms the effectiveness of the implemented solutions: total labeling time was reduced by 300 minutes per day, label waste dropped to under 5%, and daily order processing increased from 190–207 to over 220. These improvements validated not only the feasibility of the solutions but also their scalability across future production lines. The data confirms that the project achieved its performance goals while enhancing operator satisfaction and return on investment.

Control

In the Control Phase, the team ensured that the improvements implemented during the pilot would be sustained over time through the deployment of standard operating procedures (SOPs), real-time KPI dashboards, operator training, and structured feedback mechanisms. A detailed rollout timeline supported the gradual expansion of these solutions across additional production cells. Key metrics such as labeling time (≤120 min/day), label waste (≤5%), and throughput (≥220 orders/day) were consistently monitored to maintain gains. Operator involvement and periodic audits ensured compliance and adaptability. The Conclusion reflects on the project's success in reducing labeling time by 71%, minimizing waste by up to 80%, and increasing throughput by over 15%. Beyond the quantifiable outcomes, the initiative demonstrated how structured Lean Six Sigma methodologies—when combined with automation, digital integration, and human-centered design—can transform production efficiency in a sustainable and scalable way.

Gratitude

We are truly grateful for the opportunity to work on this project, which allowed us to apply Lean Six Sigma tools to a real-world challenge and see the measurable impact of data-driven solutions. This experience deepened our understanding of process improvement, teamwork, and the power of structured problem-solving. It has been a valuable learning journey that has prepared us for future roles in operations and continuous improvement.



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