Six Sigma Green Belt Project – Improving Inventory Accuracy and Reducing Discrepancy Rate

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Executive Summary

This project applied **Lean Six Sigma Green Belt methodologies** to enhance warehouse **inventory accuracy** and **reduce discrepancy rates**.
Using the **DMAIC framework**—Define, Measure, Analyze, Improve, and Control—the project systematically identified process inefficiencies, quantified variation, and implemented corrective actions.

The initiative achieved measurable improvements in **data accuracy**, **operational speed**, and **process stability**, demonstrating the effectiveness of Six Sigma tools in a real-world warehouse environment.

DMAIC Methodology Overview

Define

The problem was identified as frequent mismatches between physical inventory and system records, leading to delays, customer complaints, and additional reconciliation work.
The business case focused on improving inventory accuracy to reduce operational costs, save time, and enhance decision-making reliability.

Measure

A data collection plan was established to measure key performance metrics:

- **Inventory Accuracy (%)**

- **Discrepancy Rate (%)**

- **Reconciliation Time (hrs)**

- **Picking Time (min)**

Data was collected from **SAP/MM and APEX/APAL logs** across multiple warehouse zones. This ensured consistent sampling and reliable process evaluation.

Analyze

Statistical tools and **Pareto analysis** revealed that the majority of discrepancies stemmed from:

- Mis-scanning during receiving and picking

- Misplaced SKUs

- Unit-of-measure (UoM) errors

- Manual counting mistakes

Control charts confirmed significant variation before improvement, highlighting instability in daily processes.

Improve

Targeted process improvements were implemented:

- **Standardized labeling and bin organization**

- **Enhanced barcode scanning verification**

- **Refresher training sessions** for warehouse associates

- **Visual dashboards and KPI boards** introduced for real-time tracking

These actions resulted in measurable improvements in accuracy and efficiency.

Control

To sustain gains:

- **Control charts** and **hypothesis testing** were conducted to monitor performance.

- **Updated SOPs** were implemented for cycle counts and reconciliation procedures.

- **Periodic audits** were scheduled to ensure accuracy remains above 98%.

Data Analysis and Results

Data analysis compared **pre- and post-improvement** performance using **t-tests** and **control charts** to confirm statistical validity.

Key Results

Metric	Before	After	% Change	p-value	Interpretation
Inventory Accuracy	94%	98%	+4 pts	0.02	Statistically significant
Discrepancy Rate	9.8%	4.7%	−5.1 pts	0.03	Statistically significant
Picking Time	19.8 min	15.4 min	−22%	0.04	Statistically significant
Reconciliation Time	8.2 hr	6.0 hr	−27%	0.09	Not significant

Interpretation:

- 3 out of 4 KPIs demonstrated statistically significant improvement ($p < 0.05$).

- The process variation reduced noticeably, indicating higher control and consistency.

- The Sigma Level improved from approximately **2.1σ to 2.6σ**, marking a clear enhancement in process capability.

Reflection and Lessons Learned

This Six Sigma project provided hands-on experience in applying the **DMAIC framework** within a live warehouse setting.
Key lessons learned include:

- The importance of **accurate data collection** in defining and measuring process performance.

- How **Pareto analysis and control charts** help visualize improvement priorities.

- The value of **root cause analysis** in targeting impactful solutions.

- The significance of **hypothesis testing** in validating that observed improvements are statistically real, not random.

- The necessity of a **control plan and SOP updates** to sustain process improvements long-term.

This project not only strengthened technical and analytical skills but also reinforced the mindset of **continuous improvement** and **data-driven decision-making**—core principles of Lean Six Sigma.