



GARMENT WORKER PRODUCTIVITY ANALYSIS

DISCOVERING PATTERNS AND TRENDS

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INTRODUCTION

- The garment industry stands as a cornerstone of global manufacturing, intertwining fashion, commerce, and supply chains.
- It employs millions worldwide, contributing significantly to economies and offering livelihoods to diverse communities.
- Despite its economic vitality, the garment industry faces multifaceted challenges:
 - Rapid market changes and consumer demands.
 - Intense competition driving the need for operational efficiency.
 - Striving to maintain high-quality standards while managing production costs.

PURPOSE OF ANALYSIS

- To uncover insights that could inform decisions to optimize productivity and operational efficiency at this facility.
- By understanding historical performance across various influencing variables, we can identify opportunities for improvement.
- The end goal is to use data-driven insights from this dataset to increase productivity and profitability.
- **SIGNIFICANCE OF WORKER PRODUCTIVITY:**
 - The efficiency and effectiveness of garment workers directly impact a company's ability to navigate challenges and remain competitive.
 - Maximizing worker productivity is not only an operational necessity but also a key driver of sustainable growth in this dynamic industry.



DATASET OVERVIEW

- The dataset tracks productivity metrics for a garment manufacturing facility over several months across two key departments- sewing and finishing.
- It includes detailed measurements of factors influencing productivity such as standard minute value (SMV), work-in-progress (WIP), overtime hours, incentives paid, idle time, style changeovers and number of workers.
- The data spans five financial quarters, allowing trend analysis across seasons.

VARIABLES

- **RELEVANT VARIABLES:**
 - DATE: Captures daily productivity data over the timeline
 - DEPARTMENT: Sewing and finishing departments within the facility
- **PRODUCTIVITY DRIVERS:**
 - TARGETED PRODUCTIVITY: Benchmark or desired productivity
 - SMV: Standard minute value per garment
 - WIP: Work-in-progress garments on the line
 - OVERTIME: Overtime hours tracked
 - INCENTIVES: Monetary incentives paid to workers
- **OPERATIONAL VARIABLES:**
 - IDLE TIME: Machine downtime reducing capacity
 - STYLE CHANGEOVERS: Impacts changeover efficiency
 - NUMBER OF WORKERS: Directly influences output
 - ACTUAL PRODUCTIVITY: Key output metric compared to targeted benchmark

DATA CLEANING

- **REPLACING INCORRECT VALUES:**

- A subtle error that threatens to cast a shadow over the insights is a misspelling, a typo in the “department” column: ‘sweing’ instead of ‘sewing’. To ensure the integrity of the data, we replace the ‘sweing’ with ‘sewing’.
- As we delve deeper, another inconsistency emerges- a trailing space in the ‘finishing ’ department. The extra space leads to 3 departments – ‘sewing’, ‘finishing ’ and ‘finishing’. To restore the balance to the dataset, we trim the extra space in the value. In doing so, there are only 2 departments – ‘sewing’ and ‘finishing’.

- **MISSING VALUES:**

- Amidst the sea of data points, we stumble upon gaps, the missing fragments in our dataset. In the "work_in_progress" column, some entries are conspicuously absent. What does it mean when the value is not there? A mystery, a void that needs filling. We decide that for this particular column, an absence of a value implies no ongoing work. We fill these gaps with zeros, as if the hands of time have momentarily paused.

EXPLORATORY DATA ANALYSIS



- Here is a basic line plot where Targeted productivity is visualized against Time.
- The aggregate function is used with the formula 'targeted_productivity ~ date' to group the data by date and calculate the mean.
- **FURTHER ANALYSIS PLANNED:**
 - Correlation analysis
 - Time series analysis

HYPOTHESIS TESTING PLANNED

- **HYPOTHESIS 1:** Granting overtime does not lead to proportionate increase in actual productivity
 - Analysis: Statistical test on productivity increase percentage vs overtime increase percentage
- **HYPOTHESIS 2:** Increase in incentives provided will significantly improve actual productivity
 - Analysis: Simple linear regression between productivity (dependent variable) and incentives (independent variable)
- **HYPOTHESIS 3:** There is no significant difference between the average actual productivity achieved and average targeted productivity set across the facility.
 - Analysis: Perform Two sample t-test to compare means and compare the p-value with the significance level.

IMPACTS OF HYPOTHESIS TESTING

- **Hypothesis 1: Granting overtime does not lead to proportionate increase in actual productivity**

Possible Impact: If the statistical test on productivity increase percentage vs overtime increase percentage yields a significant result, it would suggest that there is a proportionate relationship between granting overtime and actual productivity increase. This insight could influence decision-making regarding the allocation of overtime, resource planning, and workforce management.

- **Hypothesis 2: Increase in incentives provided will significantly improve actual productivity**

Possible Impact: A significant result from the simple linear regression between productivity and incentives would suggest a meaningful relationship between the two variables. This finding could have implications for incentive programs, as it indicates that increasing incentives is associated with a significant improvement in actual productivity. It could inform management decisions on how to structure incentive programs to enhance workforce performance.

- **Hypothesis 3: There is no significant difference between the average actual productivity achieved and average targeted productivity set across the facility**

Possible Impact: If the two-sample t-test yields a non-significant result, it suggests that, on average, the actual productivity achieved is not significantly different from the targeted productivity set across the facility. This might imply that the facility is generally meeting its productivity goals. If the result is significant, it could prompt a closer examination of factors influencing the productivity gaps and potentially lead to adjustments in goal-setting or operational strategies.