Conception Phase: Increasing Production Capacity in Smartphone Plastic Manufacturing

The main objective of this project is to increase production capacity for plastic smartphone surfaces by optimizing existing processes without the need for a new production line. The management team has set two clear priorities: first, to meet growing market demand, and second, to keep production costs under control. To systematically address this challenge, the project will follow the CRISP-DM framework, ensuring a structured approach from business understanding to final deployment.

Business Understanding

Using the Voice of the Customer methodology (Griffin & Hauser, 1993), production management has identified three key requirements: consistent product quality, improved yield, and reduced lead times. Findings from the Kano model also underscore that while customers have flawless and consistent surfaces as a basic expectation, a competitive advantage can be achieved through performance factors like faster cycle times and improved machine efficiency. This project therefore focuses on analyzing production data to identify bottlenecks and understand how critical process parameters affect throughput. The results will be translated into actionable process improvements aimed at increasing output while maintaining quality.

Data Understanding

For this project, data will be sourced from the company's in-house dataset. For optimizing smartphone base plastic production, we are considering using 10 key input features, including plastic type, melt flow index, moisture content, injection temperature and pressure, mold temperature, cooling time, screw speed, clamp force, and cycle time from different tables. The main outputs for this cycle time per part and scrap rate (in %).

Project Plan and Timeline

The project will proceed according to the CRISP-DM framework as follows:

1. **Data Collection and Exploration** – Gather and assess production data (1 week).
2. **Data Preparation** – Clean, transform, and structure data for analysis (1 week).
3. **Modeling** – Apply machine learning methods to identify optimal conditions (2 weeks).
4. **Evaluation** – Validate results against throughput and quality targets (1 week).
5. **Deployment** – Present findings with actionable recommendations for process adjustments (1 week).

References

Dua, D., & Graff, C. (2019). *UCI Machine Learning Repository*. University of California, Irvine. https://archive.ics.uci.edu/ml/index.php

Griffin, A., & Hauser, J. R. (1993). The voice of the customer. *Marketing Science*, 12(1), 1–27. https://doi.org/10.1287/mksc.12.1.1