

Project Report - Phase 1: Initialization and Planning

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1.1 Introduction and Project Vision

This document initiates the **Employee Productivity Prediction** project. The vision is to leverage machine learning to forecast the productivity of garment industry workers with high accuracy. In a domain where efficiency drives competitiveness, such predictions can inform strategic planning, resource allocation, and performance optimization. This phase defines the project's scope, objectives, and technical roadmap.

1.2 Problem Statement and Business Case

Problem. Garment manufacturing runs on tight margins and schedules. Without reliable productivity forecasts, organizations face missed deadlines, suboptimal staffing, and reduced profitability. This project addresses the need for a data-driven approach to predict **actual productivity**.

Business Case. A robust predictive model will enable:

- **Improved Production Planning:** More accurate forecasts for scheduling and target setting.
- **Enhanced Resource Management:** Insights into drivers of productivity to optimize team composition and workflow.
- **Proactive Performance Management:** Early identification of teams or individuals needing support, training, or incentives.

1.3 Project Objectives and Scope

Objectives

- Conduct an in-depth analysis of the **garments_worker_productivity.csv** dataset.
- Develop and compare multiple ML models to select the most accurate predictor.
- Build a user-friendly web application for interactive predictions.
- Deploy the application on a public cloud platform for real-world use.

Scope

Covers the full ML lifecycle: data exploration, preprocessing/feature engineering, model training and evaluation, and deployment as a web service.

1.4 Technology Stack Selection

- **Language:** Python 3
- **Core Libraries:** Pandas, NumPy, scikit-learn, XGBoost
- **Web Framework:** Flask
- **Deployment:** Render with Gunicorn as the WSGI server

This stack is mature, well-supported, and suitable for both machine learning and web delivery.