

## **Project Report - Phase 1: Initialization and Planning**

**Author:** Abhay **Date:** August 5, 2025 **Project:** Employee Productivity Prediction

### **1.1. Introduction and Project Vision**

This document marks the commencement of the Employee Productivity Prediction project. The primary vision is to leverage machine learning to create a predictive tool that can accurately forecast the productivity of garment industry workers. In a sector where operational efficiency is a key driver of success, such a tool can provide invaluable insights for management, aiding in strategic planning, resource allocation, and performance optimization. This initial phase outlines the foundational steps taken to define the project's scope, objectives, and technical roadmap.

### **1.2. Problem Statement and Business Case**

**Problem:** The garment manufacturing industry operates on tight margins and demanding schedules. The inability to reliably predict workforce productivity can lead to missed deadlines, inefficient resource allocation, and reduced profitability. This project addresses the critical need for a data-driven approach to forecast the actual productivity of employees.

**Business Case:** By developing a predictive model, the project aims to deliver tangible business value, including:

- **Improved Production Planning:** More accurate forecasting allows for better scheduling and target setting.
- **Enhanced Resource Management:** Identifying factors that influence productivity can help in optimizing team composition and workflow.
- **Proactive Performance Management:** The tool can help identify teams or individuals who may require additional support or incentives.

### **1.3. Project Objectives and Scope**

The objectives for this project are as follows:

- To conduct a thorough analysis of the provided `garments_worker_productivity.csv` dataset.
- To develop and compare multiple machine learning models to find the most accurate predictor.
- To build a functional web application that allows users to interact with the predictive model.
- To deploy this application to a public cloud platform, making it accessible for real-world use.

**Scope:** The project will encompass the entire machine learning lifecycle, from data exploration and preprocessing to model training, evaluation, and deployment as a web service.

#### **1.4. Technology Stack Selection**

The following technologies have been selected for this project:

- **Programming Language:** Python 3
- **Core Libraries:** Pandas, NumPy, Scikit-learn, XGBoost
- **Web Framework:** Flask
- **Deployment:** Render, with Gunicorn as the web server.

This stack was chosen for its robustness, extensive community support, and suitability for both machine learning and web development tasks.