

AN ASSESSMENT OF THE IMPACT OF AUTOMATION, REAL-TIME MANAGEMENT AND DIGITALIZATION OF DUMP TRUCK OPERATIONS. A CASE STUDY OF A ROOM AND PILLAR PLATINUM MINE IN ZIMBABWE



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INTRODUCTION

- Digital transformation reshaping mining.
- Focus: Dump truck automation at a platinum mine in Zimbabwe.
- KPIs: Availability, Productivity, Cycle Time, OEE.



BACKGROUND

- Manual dump trucks: inefficient, prone to downtime.
- Automation improves efficiency, reduces human error.
- Zimbabwe targets \$12B mining economy by 2030.

PROBLEM STATEMENT

- No formal post-implementation review conducted.
- Lack of data-driven insight hinders scalability.
- Uncertainty in return on investment.

AIMS & OBJECTIVES

□ Aim

- Evaluate impact of automation on dump truck operations.

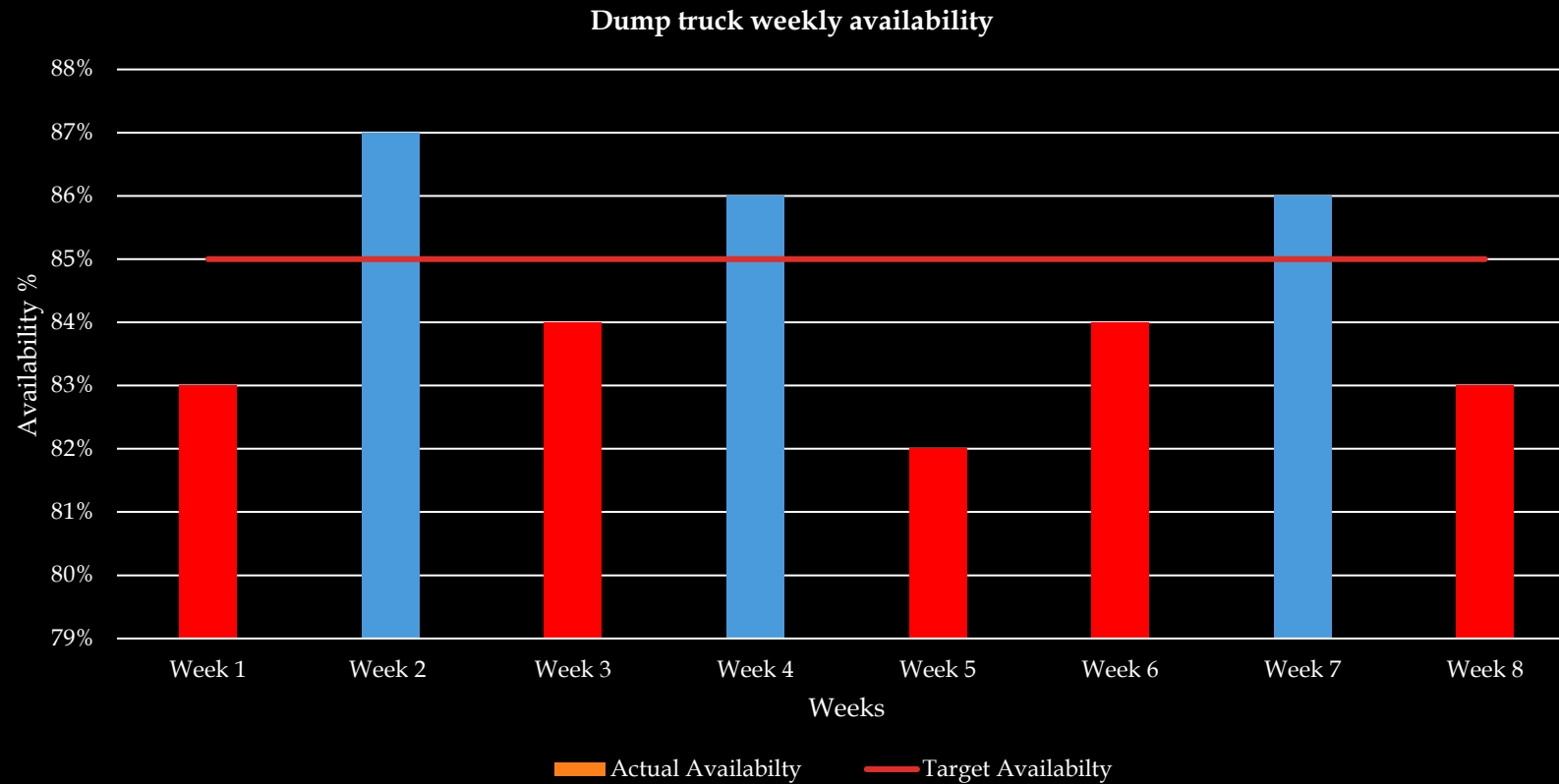
□ Objectives

- 1. Analyse pre-implementation KPIs.
- 2. Analyse post-implementation KPIs.
- 3. Comparative analysis.
- 4. Recommend for other portals.

METHODOLOGY

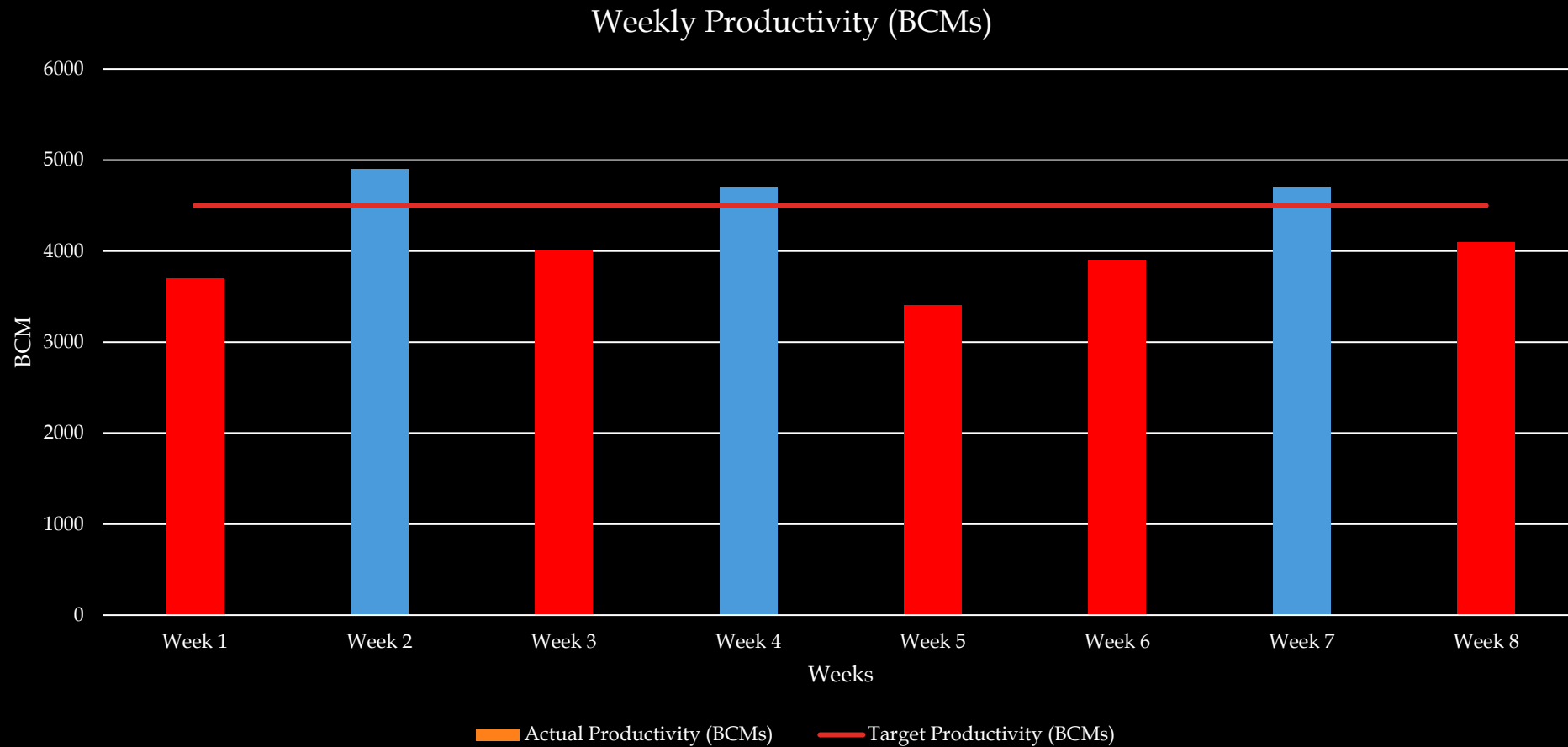
- Comparative case study design (pre vs post).
- Mixed methods: qualitative + quantitative.
- Sample: Operators, Maintenance, Supervisors.
- Data: Reports, Logs, Surveys.

RESULTS (PRE-IMPLEMENTATION KPIS – AVAILABILITY)



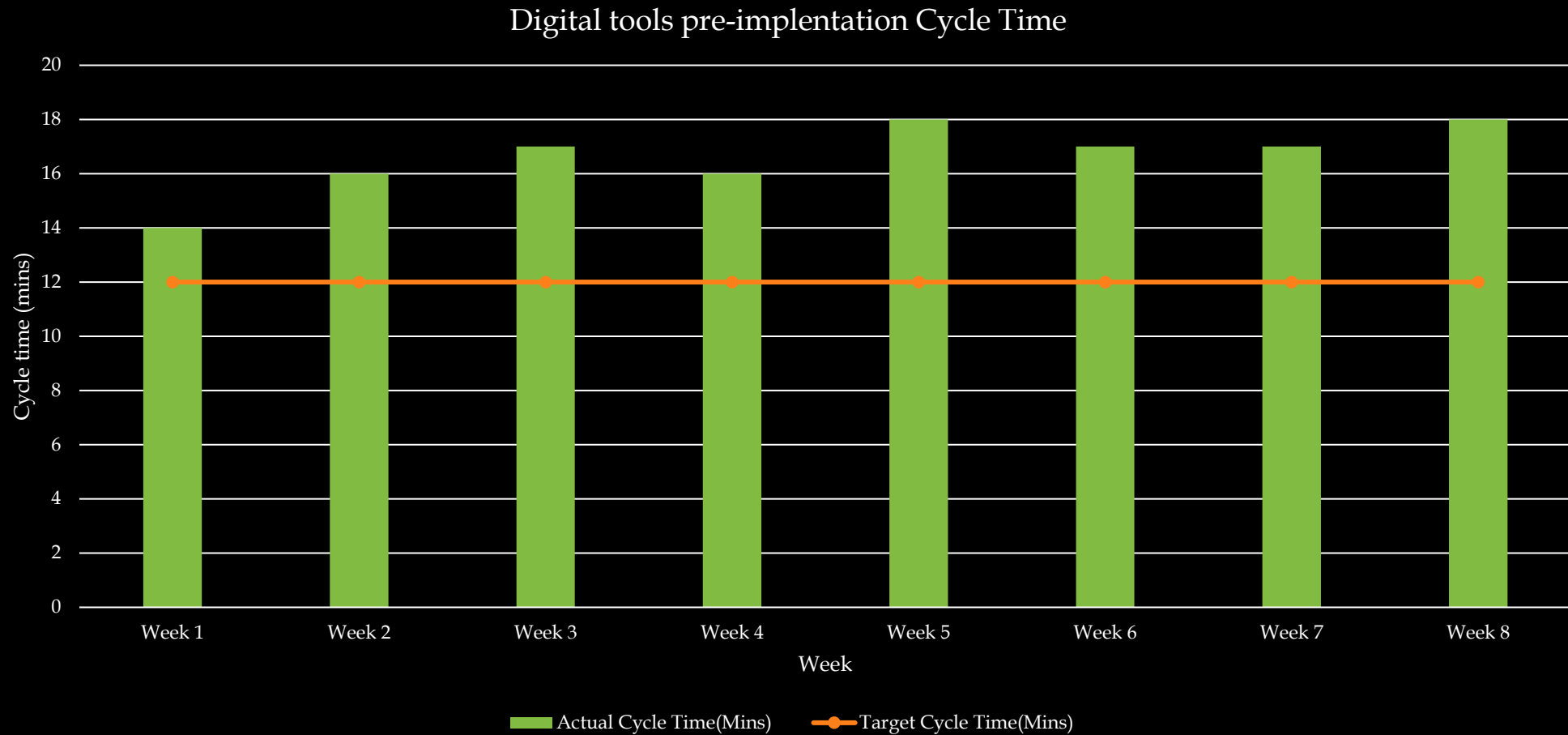
- Availability <85% (maintenance issues, fatigue).

RESULTS (PRE-IMPLEMENTATION KPIS – PRODUCTIVITY)



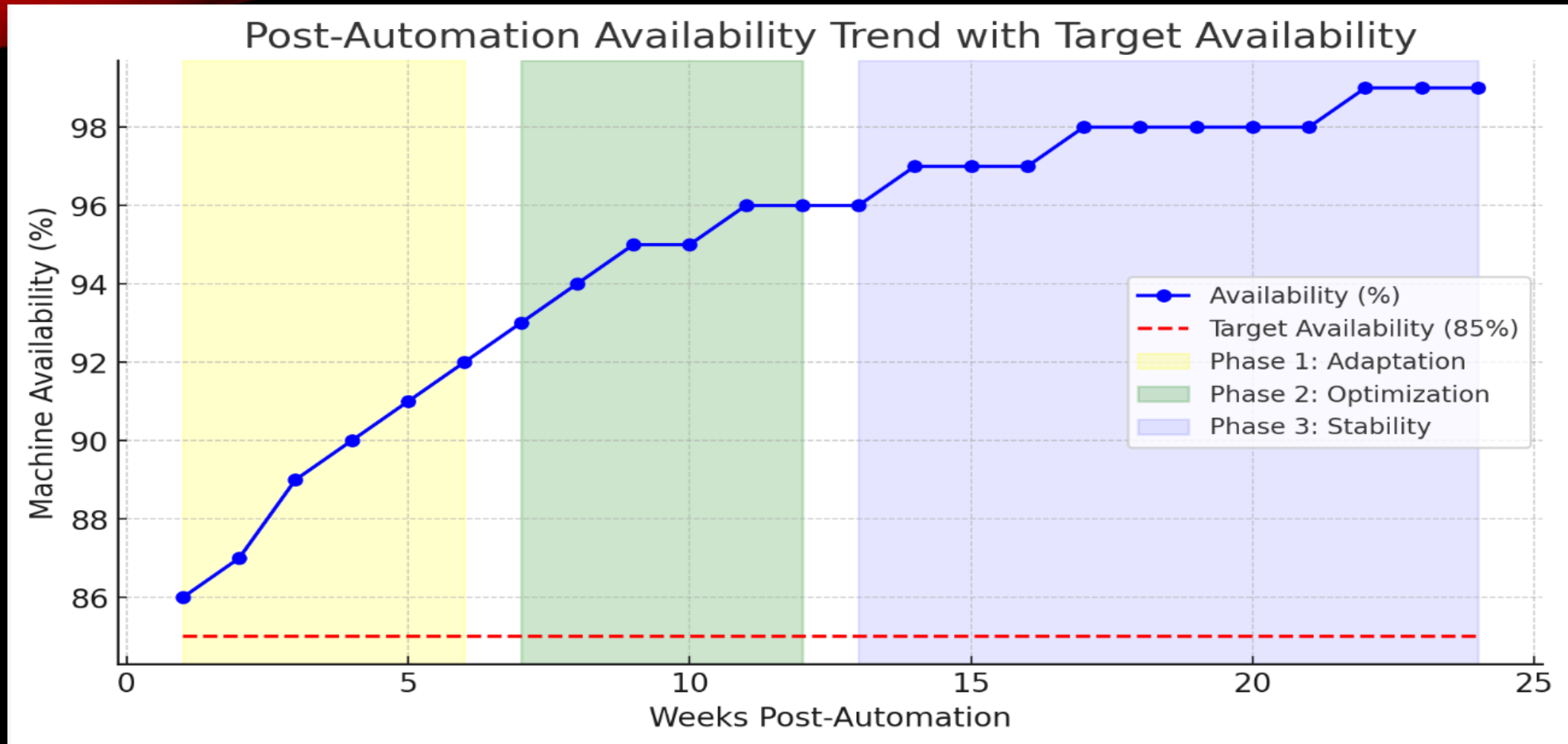
- Productivity: 3,400–4,900 BCM (fluctuating).

RESULTS (PRE-IMPLEMENTATION KPIS – CYCLE TIME)



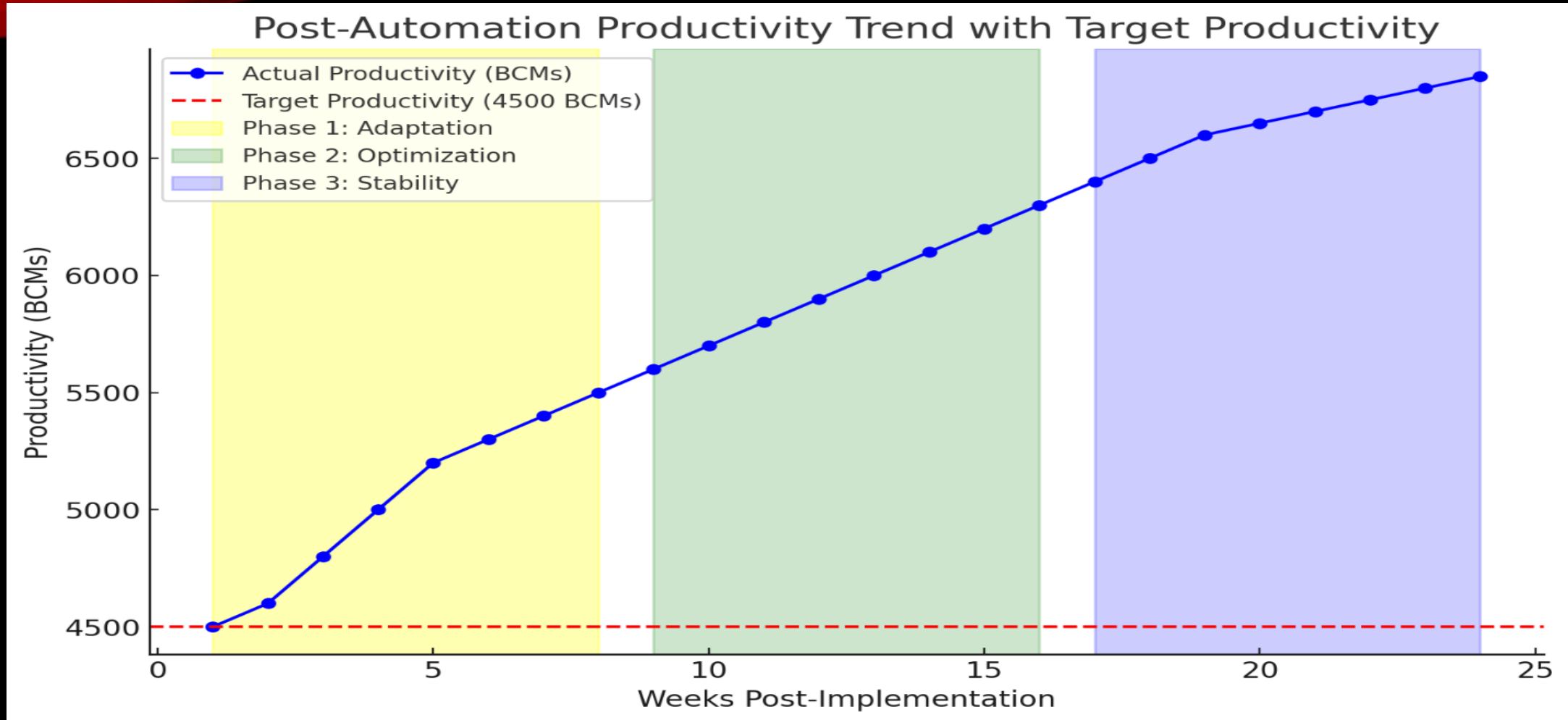
Cycle time: Above target due to manual inefficiencies.

RESULTS (POST-IMPLEMENTATION KPIS – AVAILABILITY)



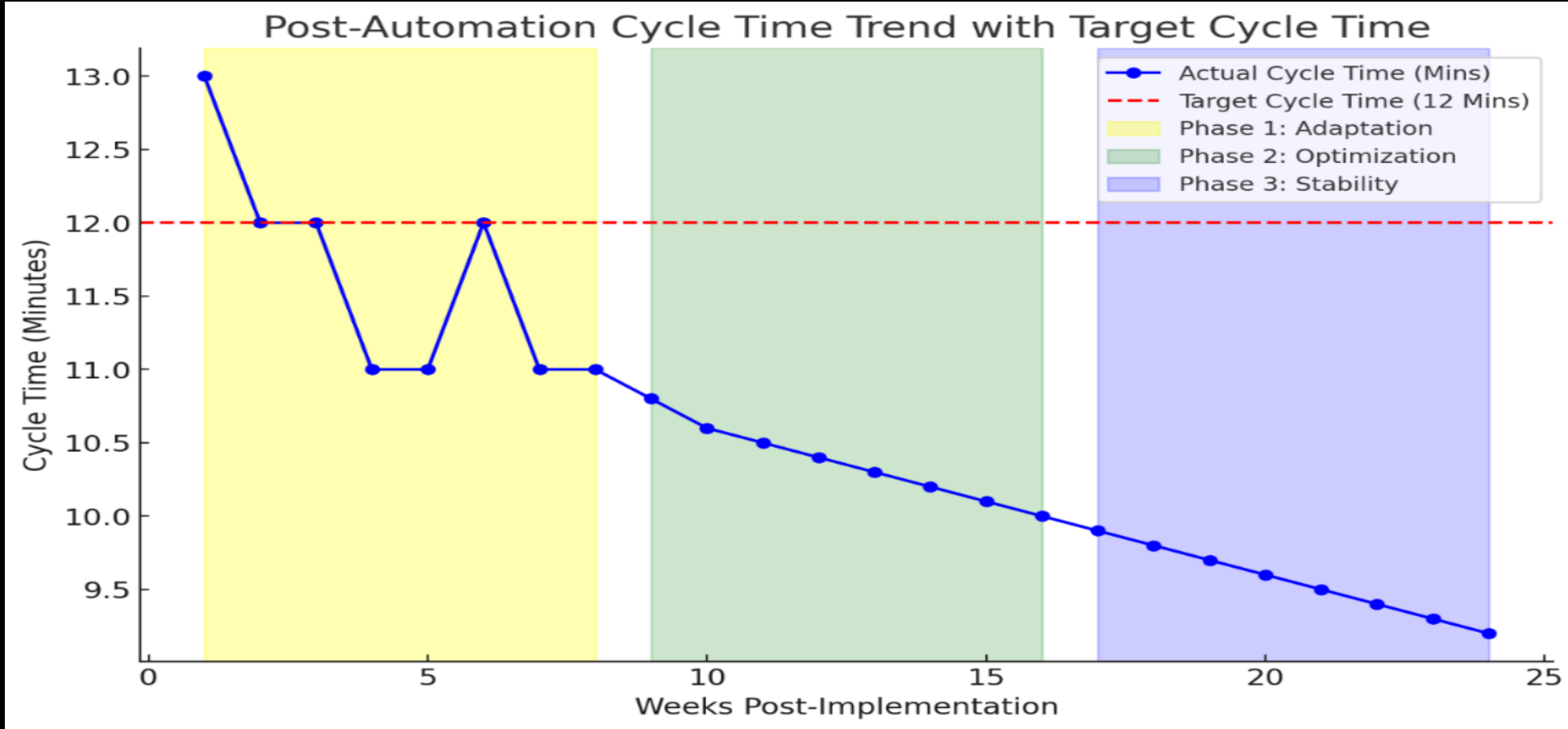
- Availability >98% by Week 24.

RESULTS (POST-IMPLEMENTATION KPIS – PRODUCTIVITY)



- Productivity stabilized at 6,400 BCM.

RESULTS (POST-IMPLEMENTATION KPIS – CYCLE TIME)

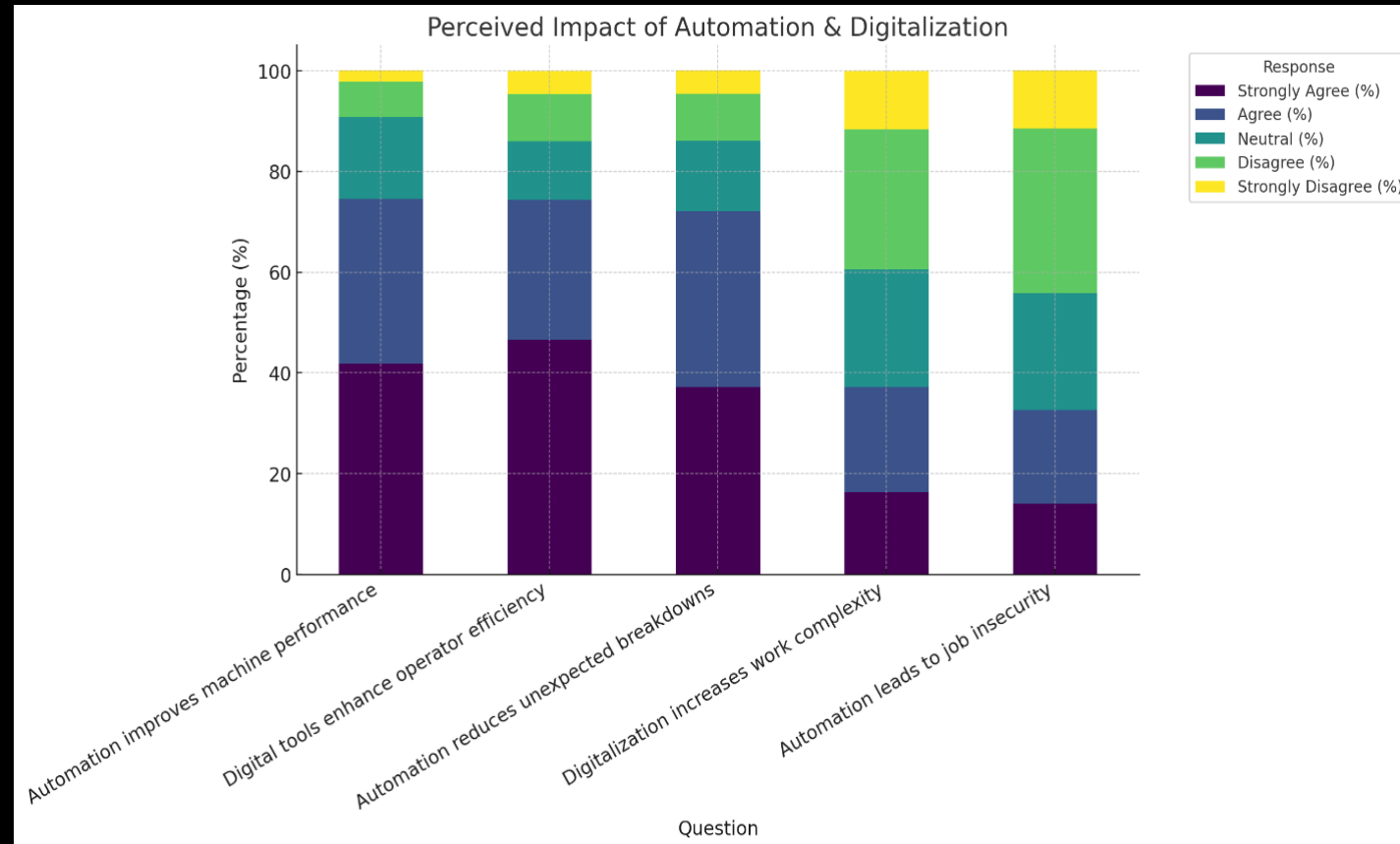


- Cycle time reduced to 9.2 mins.

KPI COMPARISON SUMMARY

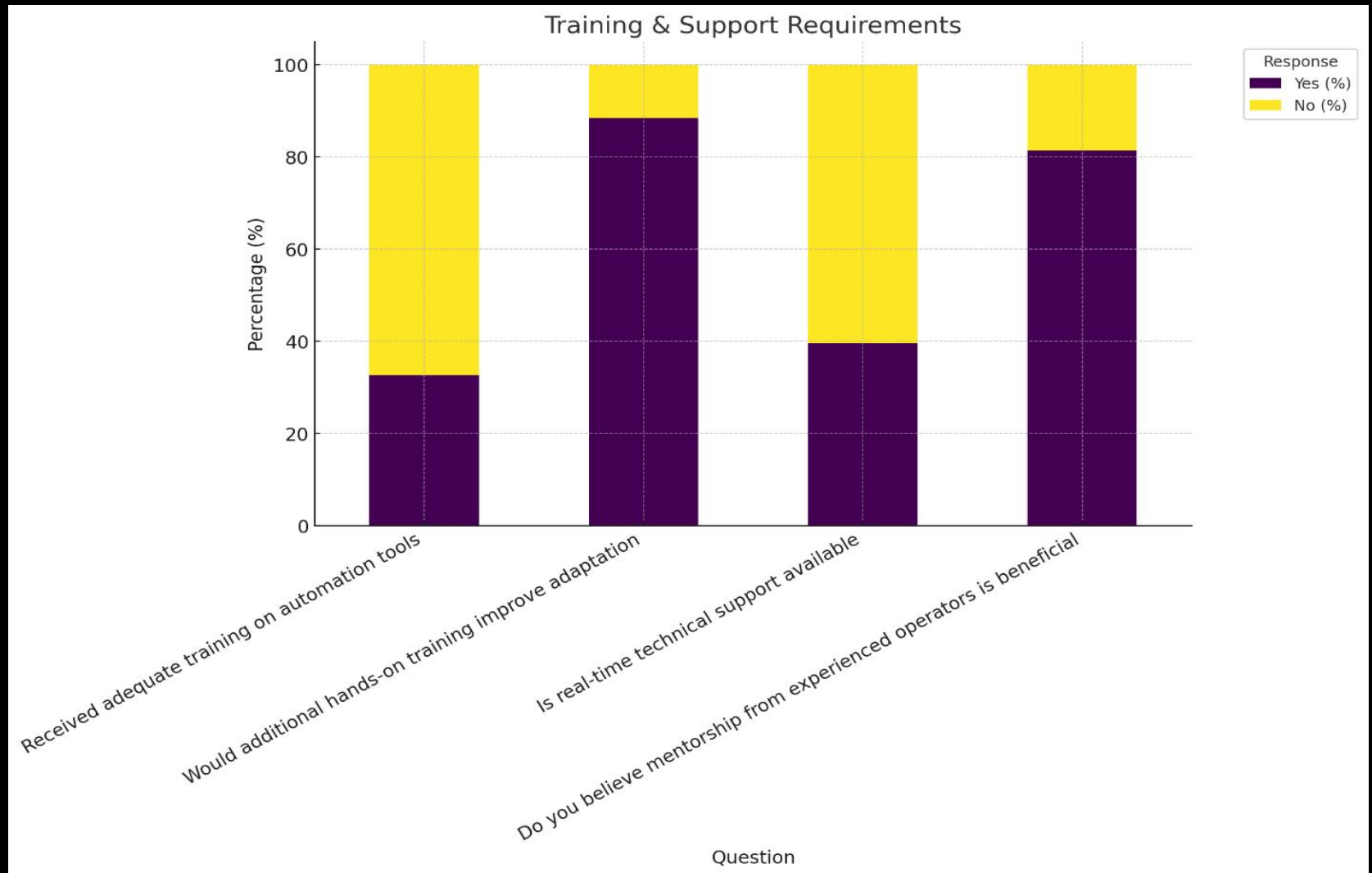
- Bar charts: Availability, Productivity, Cycle Time.
- Clear improvement after automation.
- Phases: Adaptation → Optimization → Stability.

QUALITATIVE ANALYSIS – PERCEIVED IMPACT OF AUTOMATION AND DIGITALISATION



- 74.5%: Improved performance.
- 72.1%: Fewer breakdowns.

QUALITATIVE ANALYSIS – TRAINING AND SUPPORT REQUIREMENTS



- 67.4%: Undertrained staff.
- 81.4%: Value peer mentorship.

CHALLENGES IDENTIFIED

- High cost of systems.
- Integration with legacy tools.
- Cyber security vulnerabilities.
- Workforce adaptation needed.

RECOMMENDATIONS

- Establish baseline performance data.
- Implement AI diagnostics.
- Structured training & mentorship.
- Phased, site-specific rollout.

CONCLUSION

- Significant KPI improvements achieved.
- Human factors limit full benefits.
- Roadmap for scalable digital transformation.



QUESTIONS & DISCUSSIONS

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THANK YOU FOR YOUR ATTENTION!