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Abstract

This project aims to solve the problem of the pharmaceutical companies' excessive use of RODAC and STA plates, which increases waste production and negatively affects the environment. The study uses a thorough methodology that combines qualitative and quantitative research to find the causes of these plates' excessive use and suggests waste reduction techniques. The technique consists of data gathering to estimate plate usage and related expenses, interviews to understand the current usage, and a literature review to investigate current practices. This initiative aims to promote eco-friendly methods in the pharmaceutical sector.

Key Terms - Continuous improvement, process optimization, sustainability, waste reduction, agar.

Introduction

The excessive use of RODAC and STA plates has emerged as a significant challenge in pharmaceutical industries, leading to increased waste generation, environmental impact, and operational inefficiencies. The use of RODAC and STA plates beyond necessary levels contributes to unnecessary costs, strains environmental resources, and undermines efforts toward greener manufacturing practices. This issue requires attention to identify the root causes of excessive plate usage, evaluate the associated costs and environmental consequences, and develop targeted strategies for waste reduction while maintaining quality assurance standards within pharmaceutical manufacturing processes.

Background

Environmental monitoring is a tool to assess environmental conditions and trends, support policy development and its implementation, and develop information for reporting to national policymakers, international forums, and the public. In pharmaceutical manufacturing facilities, environmental monitoring plays a critical role in ensuring the safety and quality of products. Surface and air monitoring are commonly performed using agar plates such as Settle Plates (STA) and RODAC (Replicate Organism Detection and Counting) plates to detect microbial contamination. However, the excessive use of these agar plates can result in increased costs, resource consumption, and environmental impact. Therefore, this project aims to explore strategies for optimizing the use of STA and RODAC agar plates in pharmaceutical industries, with the goal of reducing waste while maintaining stringent quality standards.

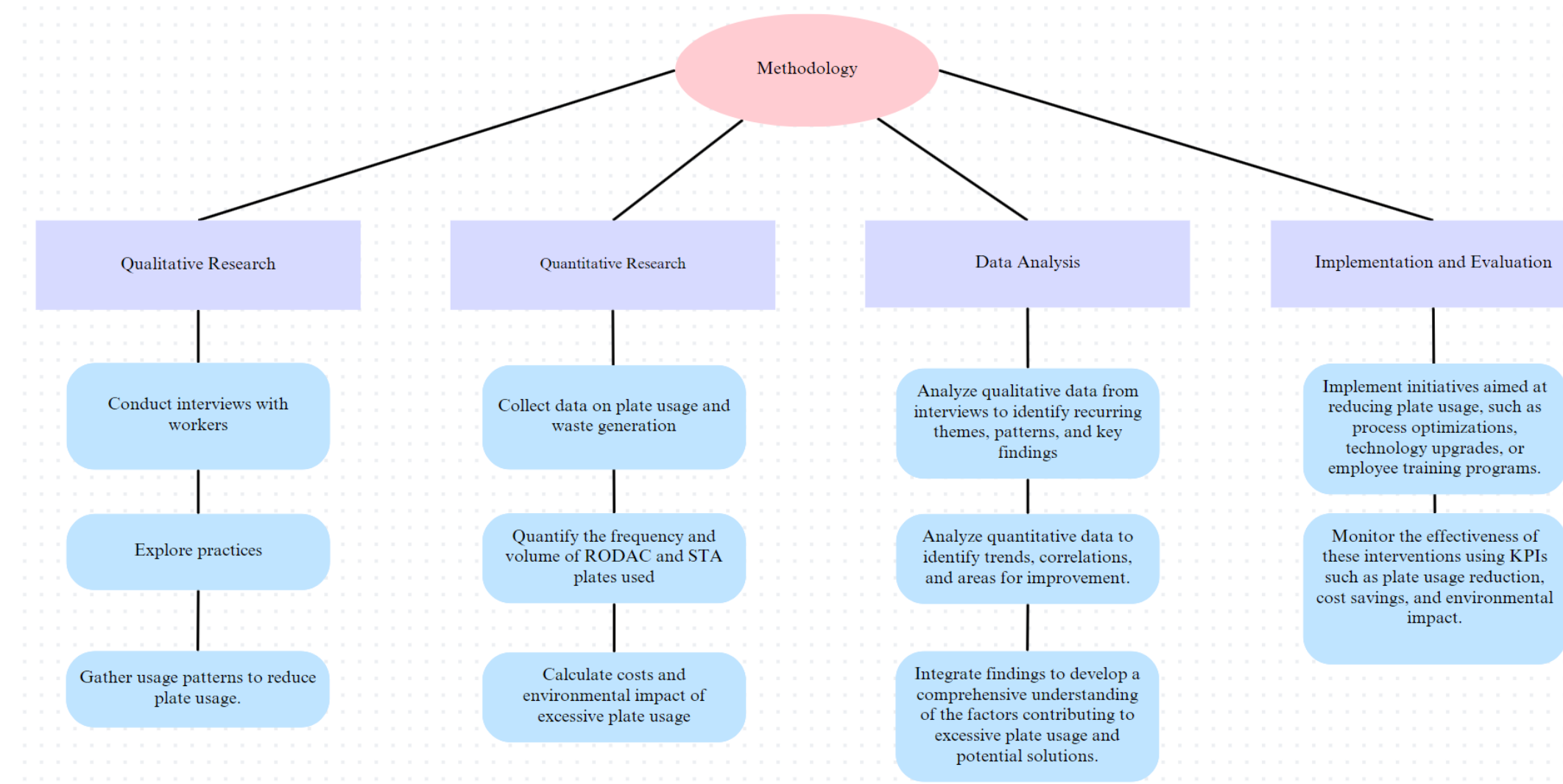
By addressing these issues, companies can achieve cost savings, minimize environmental footprint, and enhance efficiency in their processes. This practice results in unnecessary waste of resources, and disposal costs. Reducing the costs of the purchase of this plates and helping the environment at the same time is a great win for the company and their aim at being a greener company.

Problem

The use of RODAC and STA plates beyond necessary levels contributes to unnecessary costs, strains environmental resources, and undermines efforts toward greener manufacturing practices. By identifying the root causes of excessive plate usage, we are able to save the company money from unnecessary costs and help the environment by reducing waste while maintaining quality assurance standards within pharmaceutical manufacturing processes.

Methodology

The methodology for this project involves combination of methods:



By using a mixed-methods approach that combines qualitative and quantitative research methods, the methodology aims to provide a holistic understanding of the problem and facilitate the development of targeted interventions to reduce the excessive use of RODAC and STA plates in pharmaceutical industries.

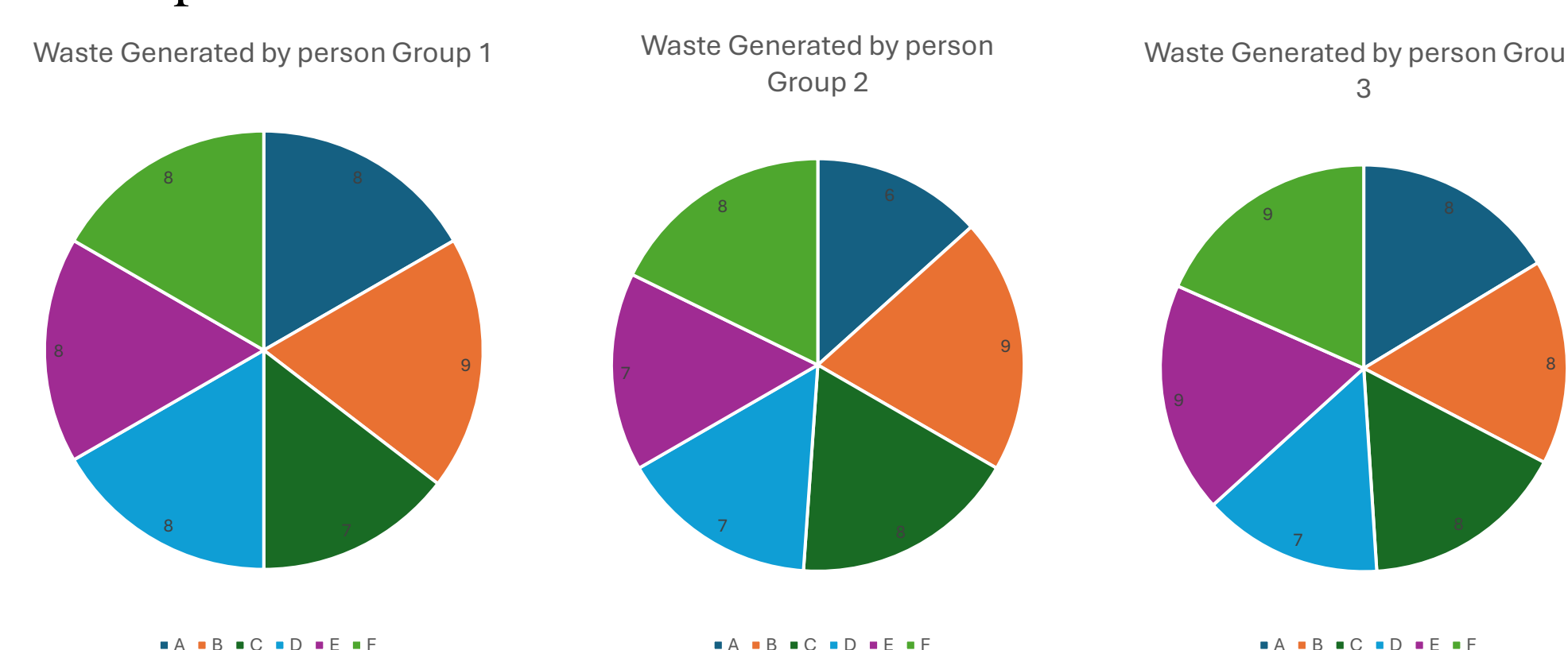
Results and Discussion

Some of the positive results obtained with the implementation on smaller RODAC and STA plate packages were:

- **Reduction in Plate Usage:** After implementing optimized sampling protocols and revising SOPs, there was a reduction in the use of RODAC and STA plates across the manufacturing sites. This reduction not only decreased the cost associated with purchasing these plates but also minimized waste generation.
- **Cost Savings:** The reduction in plate usage translated into significant cost savings for the company. It was calculated that the company saved approximately 60% annually by reducing the overuse of these plates.
- **Environmental Impact:** The project also had a positive environmental impact, as the reduction of plates led to a decrease in the amount biohazard waste generated. This supports the company's sustainability goals and reduces the environmental footprint of the manufacturing processes.

The RODAC and STA plates packages being currently used in the manufacturing area contain 10 plates each from which only 2 RODAC are used and 8 STA plates per process. This produced a high amount of waste because once a package is opened, for aseptic reasons they cannot be reused. After evaluation of different options, we came across plates that came in separate packages and were put to the test in the manufacturing processes as well as STA plates that came in smaller quantities.

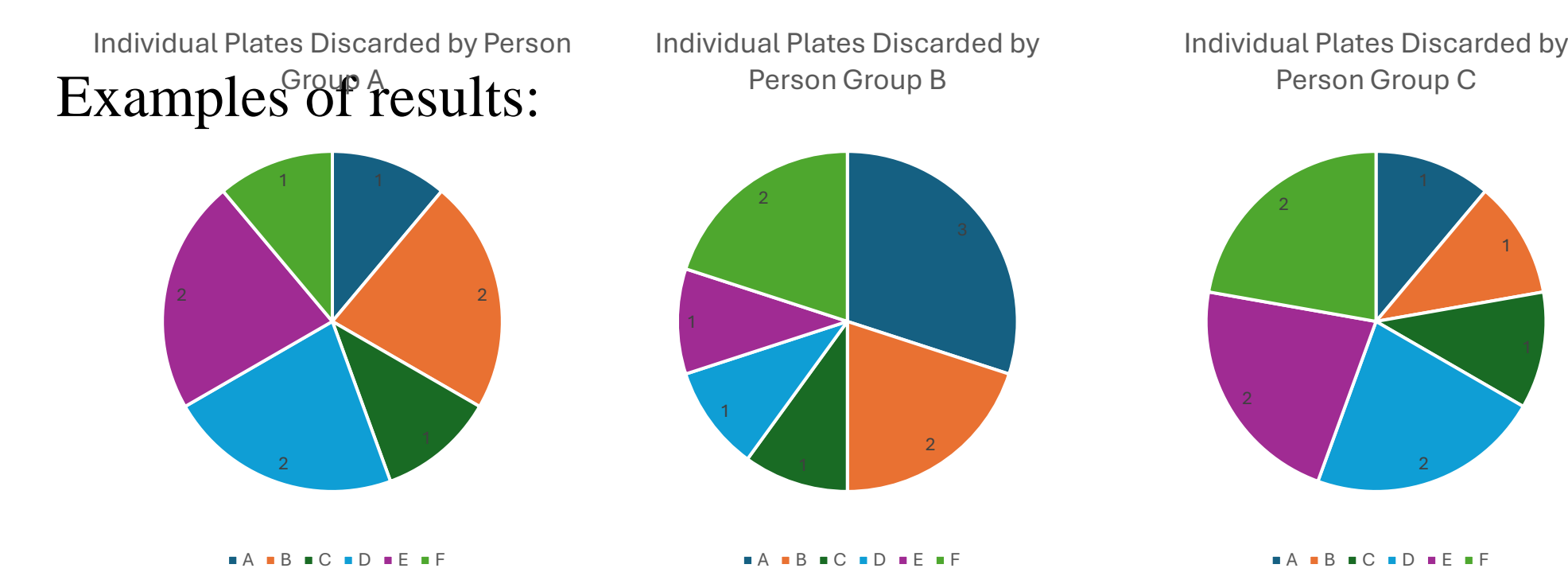
Examples of results:



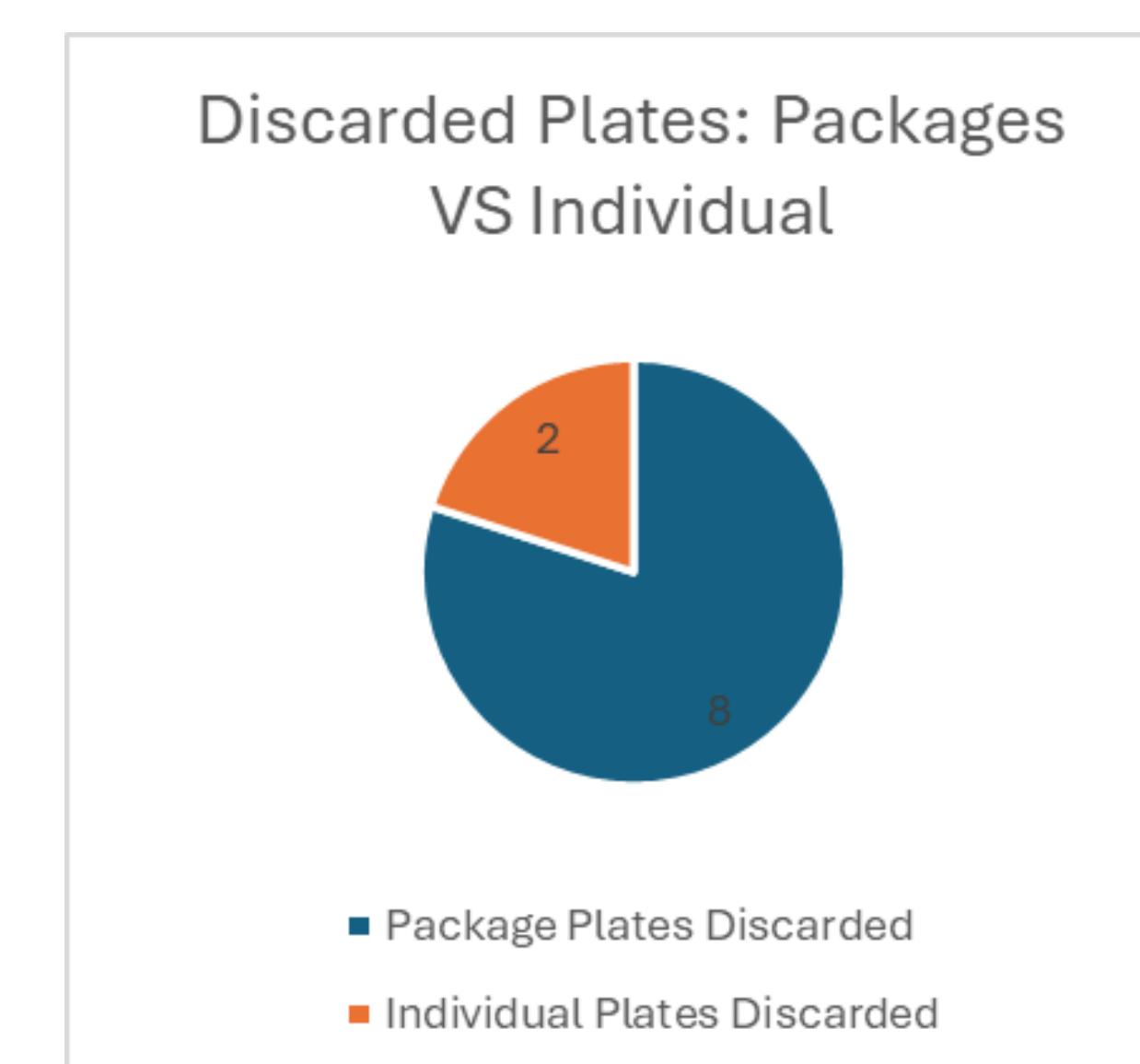
Results and Discussion (Cont.)

9 groups were used to evaluate the plate usage in the company. The experiment ran for 2 months to be able to give all the people the opportunity to participate and see their usage of the plates. The first month was used for the packaged plates and the second month for the plates in individual packages. Each group was asked how much plates were wasted by package by person when working on the inoculation process and the following results were obtained.

From packages containing 10 plates each, every person discarded more than half the package. This is because the process is made to last mostly an hour and a half, and each plate is used for runs of 1 hour at most. The people who use 3 or 4 is because something unusual happens and the process lasts longer but is not the day-to-day process. An average of 8 plates are discarded by person for different reasons previously mentioned. This means that the individual packaged plates were the most effective for the line f work being produced.



About an 80% hazardous waste reduction was obtained with this experiment. This helps reduce the cost of hazardous waste management for the company and the individual plates come at a lower cost.



Conclusions

This project successfully demonstrated that significant improvements in resource efficiency can be achieved through the optimization of existing practices. The initiative not only resulted in a high percent reduction in plate usage but also enhanced the overall efficiency of microbiological testing processes. The project highlights that with strategic adjustments, companies can maintain high standards of quality control while also reducing their operational costs and environmental impact. The decrease in plate usage resulted in a tangible reduction in plastic waste, aligning the company's operations with broader sustainability goals. This

Conclusions (Cont.)

environmental impact is particularly important in an industry where regulatory demands often result in high levels of consumable waste. As the industry continues to evolve, the lessons learned from this project will be invaluable in guiding future improvements and ensuring that operational practices remain both effective and environmentally responsible.

Overall, the project demonstrates that careful evaluation and adjustment of not only standard procedures, but also the materials being used can lead to significant improvements in both cost efficiency and environmental sustainability, while maintaining the stringent quality standards required in the pharmaceutical industry.

Future Work

For future work, I am looking forward to keep making the inoculation area more sustainable and cost-effective for the company because there is always room for improvement.

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