

CHAPTER 1 - INTRODUCTION

1.1. Background

Remanufacturing has provided significant economic, social, and environmental advantages for a minimum of 28 years. The United States of America is the origin of the 3R (Reduce, Reuse, and Recycle) approach, and remanufacturing enterprises have experienced substantial growth to become established practices in various industries. Remanufacturing engineering has rapidly progressed and is now being employed in industrial settings in poor nations. The United States Environmental Protection Agency created the Comprehensive Procurement Guidelines program with the aim of reducing waste and conserving resources. This program promotes the reuse of existing materials and ensures that specific components can be recycled into new product materials. Reman Global Magazine's March/April 2018 edition reports that the remanufacturing industry is expanding in multiple countries, with an estimated annual value of \$160 billion. The countries mentioned include the USA with a contribution of \$100 billion, Europe with \$32 billion, Asia with \$27 billion, and Brazil with \$1.4 billion. Asia, including Indonesia, is the third largest region in terms of the dispersion of the remanufacturing industry. The remanufacturing business offers significant economic prospects, with a robust projection suggesting that its yearly income will surpass 160 billion dollars. Unlike original equipment products, the remanufacturing business carries a higher risk of product failure.

PT United Tractors Pandu Engineering (UTE) through its brand, ULTRA aims to be one of the best component management solutions in Indonesia. Currently UTE has Plant/Sub Plant Remanufacturing spread across 9 areas, starting from Jakarta (RJKT), Pakanbaru (RPKB), Tanjung Enim (RTJE), Balikpapan Sudirman (RBPS), Sangatta (RSGT), Banjarmasin (RBJN), Balikpapan Mulawarman (RBPM), Adaro (RADO), Balikpapan Kariangau (UBPK), and Timika (RTMK).

Remanufacturing customer satisfaction comes from the Quality received by the customer. Remanufacturing product failure during production is referred to as Product Failure in Process (FIP), Remanufacturing product failure after being received by the

customer is referred to as Product Failure in the Field (FIF), and Cost absorbed by company caused by product failure is referred to as Cost of Product Failure.

A company's failure to manage product failure in process will have an impact on high product failure in the field which will ultimately result in a high cost of product failure, so it becomes important to reduce product failure in process for remanufactured products.

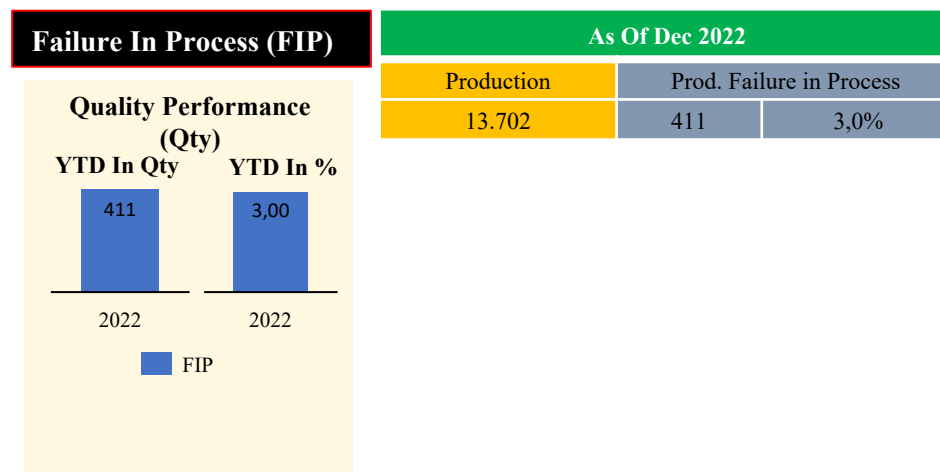


Figure 1.1 Ratio Product Failure in Process 2022

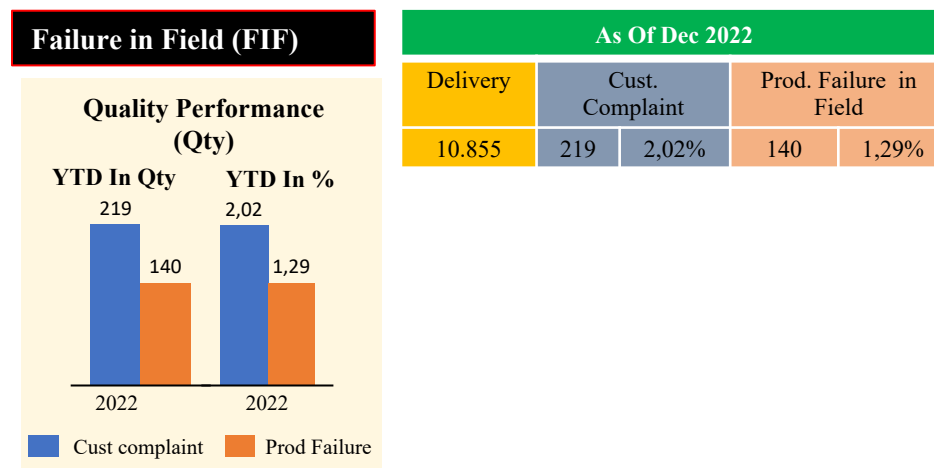


Figure 1.2 Ratio Product Failure in Field 2022

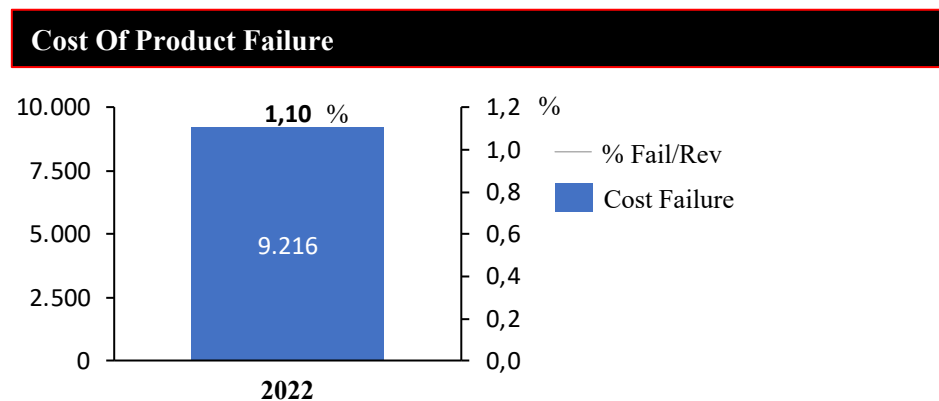


Figure 1.3 Cost of Product Failure 2022

One of the Company's Key Performance Indicators (KPI) is to reduce product failure in process with a maximum ratio of 2.5%. The method determined by management is to implement Six Sigma.

Valles et al. (2009) define Six Sigma as a perpetual method for enhancing organizational performance by pinpointing and eradicating the fundamental sources of mistakes, harm, and lags in business operations. This study aims to improve the performance of remanufactured items in UTE by utilizing Six Sigma methods. Multiple studies have shown that these methods lead to positive outcomes, such as decreased failed products rates and raised sigma levels, in problem-solving scenarios.

1.2. Research Problems

Companies must exert innovative endeavours to avoid losing their market share. Consumers consistently desire creative items as their preferences and requirements evolve in tandem with societal shifts. Desirable products are those that not only fulfil consumers' wants but also deliver satisfaction to their users. The FIP in 2022 is 3.0% and need the activity to suppress as little as possible, where product failure in the process can be caused by Man, Method, Material and Machine factors.

1.3. Research Objectives

In this research, the objective is to design, develop, and evaluate Six Sigma to improve product quality in Remanufacturing Company. Researchers aim of this research is analyse impact of Six Sigma implementation to reduce remanufacturing product failure in process.

1.4. Significance of Study

In this research, it could open an opportunity to implement SIGMA in UTE as Remanufacturing Company, reduce product failure in process, improve product quality, and set based line for Remanufacturing Company.

1.5. Research Questions

The research question for this thesis proposal is elaborated as follows:

Question #1: What is the Six Sigma implementation can reduce product failure in process?

Question #2: What are the impacts of Six Sigma implementation to improve product quality?

1.6. Hypothesis

Hypothesis # 1: Six Sigma implementation in remanufacturing company can improve product quality and reduce product failure in process.