ABSTRAK

Penelitian ini bertujuan untuk mengetahui faktor-faktor apa saja yang menyebabkan cacat/defect pada pupuk NPK Kebomas, bagaimana rancangan perbaikan peningkatan kualitas pupuk NPK Kebomas dengan metode *Six Sigma* dan *Failure Mode Effect Analysis* (*FMEA*), potensi penurunan biaya dengan penerapan metode *Six Sigma* dan *FMEA*. Penelitian ini menggunakan *Six Sigma DMAIC* (Define, Measure, Analyze, Control). Pada langkah *define* , mengidenfikasi masalah dan *Key Performance Indicators* (*KPI*). Pada langkah *Mesure*, menggunakan *Failure Classifier* (*FC*), yang memungkinkan untuk menentukan jenis kegagalan masing-masing operasi selama proses produksi serta *FMEA* digunakan untuk mengukur kegagalan dengan menghitung *Risk Priority Number* (*RPN*). Untuk menunjukkan tingkat kualitas produk *Product Sigma Performance Level* (*PSPL*) dihitung berdasarkan hasil *FMEA*. Biaya tiap kegagalan dihitung berdasarkan *Cost Weighted Factor for Risk Priority Number* (*CWF$_{RPN}$*). Langkah *analyze* merupakan tahapan menganalisa penyebab masing-masing kegagalan serta *recommended action* yang akan dilakukan. Langkah *Improve* dan *Control* yaitu melaksanakan *recommended action* pada tahapan *analyze* serta melakukan monitoring akan konsistensi pelaksanaan *recommended action* tersebut.

Pendekatan yang digunakan dalam penelitian ini adalah pendekatan penelitian kuantitatif. Jenis pengambilan sampel *non probability sampling* dengan teknik sampling jenuh (semua anggota populasi dijadikan sample). Responden dalam penelitian ini sebanyak 38 responden dipilih dari pegawai yang bekerja lebih dari 10 tahun di operasional NPK Kebomas dengan pertimbangan dari sisi pengetahuan dan pengalaman kerja.

Simpulan dari penelitian adalah terdapat 47 *failure cause* penyebab defect pada Pupuk NPK Kebomas yaitu Penyiapan Bahan Baku terdiri dari 11 failure cause, Granulasi terdiri dari 10 failure cause, Finishing terdiri dari 13 failure cause, Personil terdiri dari 4 failure cause, Training terdiri dari 3 failure cause, Manajemen terdiri dari 1 failure cause External Factor terdiri dari 5 failure cause. Dari FMEA dan Failure Cost Calculation didapatkan RPN_{REAL} = 5036, CWF_{RPN} = Rp 5 Milyar sehingga didapat *Proses Yield* (*PY*) = 89.3% serta PSPL = 2.78σ. Apabila melakukan recommended action sesuai dengan FMEA *Worksheet* maka RPN_{REAL} = 1476, CWF_{RPN} = Rp 1.5 Milyar, *PY* = 96.9% (target KPI 95%) serta PSPL = 3.8σ .

Kata kunci : pupuk NPK Kebomas, *Six Sigma* (DMAIC), *Failure Classifier* (FC), *Failure Mode and Effect Analysis* (FMEA), *Process/Product Sigma Performance Level* (PSPL), *Failure Cost Calculation* (FCC), *Cost Weighted Factor for Risk Priority Number* (CWFRPN).

ABSTRACT

This study aims to determine what factors cause defects in NPK Kebomas fertilizer, how to design improvement of quality of NPK Kebomas fertilizer with Six Sigma and Failure Mode Effect Analysis (FMEA) method, potential cost reduction with the application of Six Sigma Method and FMEA. This study uses Six Sigma DMAIC (Define, Measure, Analyze, Control). In define step, identify the problem and Key Performance Indicators (KPI). In Mesure step, use the Failure Classifier (FC), which allows to determine the type of failure of each operation during the production process and FMEA is used to measure failure by calculating Risk Priority Number (RPN). To show product quality level Product Sigma Performance Level (PSPL) is calculated based on FMEA result. The cost of each failure is calculated based on the Cost Weighted Factor for Risk Priority Number (CWF_{RPN}). Analyze Step is the stage of analyzing the causes of each failure and recommended action to be performed. Step Improve and Control is to implement recommended action in the stages of analyze and to monitor the consistency of the recommended action implementation.

The approach used in this research is quantitative research. Type of sampling is non probability sampling with saturated sampling technique (all population members are sampled). Respondents in this study are 38 respondents selected from employees who work more than 10 years in operational NPK Kebomas with consideration of the knowledge and work experience.

Conclusion from the research are there are 47 failure cause defect at NPK Kebomas fertilizer that is Raw Material Preparation consists of 11 failure cause, Granulation consists of 10 failure cause, Finishing consists of 13 failure cause, Personnel consists of 4 failure cause, Training consists of 3 failure cause, Management consists of 1 failure cause External Factor consists of 5 failure cause. From FMEA and Failure Cost Calculation obtained RPN_{REAL} = 5036, CWF_{RPN} = Rp 5 Billion so obtained Process Yield (PY) = 89.3% and PSPL = 2.78σ. When performing recommended action in accordance with FMEA Worksheet then RPN_{REAL} = 1476, CWF_{RPN} = Rp 1.5 Billion, PY = 96.9% (95% KPI target) and PSPL = 3.8σ.

Keywords: NPK Kebomas, Six Sigma (DMAIC) fertilizer, Failure Classifier (FC), Failure Mode and Effect Analysis (FMEA), Process / Product Sigma Performance Level (PSPL), Failure Cost Calculation (FCC), Cost Weighted Factor for Risk Priority Number (CWF_{RPN}).