

## ABSTRAK

Penulis : Muhammad Reza  
Program Studi : Magister Teknik Industri  
Judul : **FORMULASI MODEL PREDIKSI KUALITAS  
MENGUNAKAN *PRINCIPAL COMPONENT ANALYSIS*  
DAN ALGORITMA KLASIFIKASI PADA *MULTI-  
STAGE MANUFACTURING SYSTEM***  
Pembimbing : Fahmi Arif, S.T., M.T., Ph.D.

Kemampuan melakukan prediksi kualitas produk saat proses produksi berlangsung merupakan suatu keuntungan bagi suatu perusahaan manufaktur dalam menghadapi persaingan. Kenyataannya, formulasi model prediksi kualitas terutama pada sistem *multi-stage manufacturing* (MMS) merupakan suatu pekerjaan yang tidak sederhana dan memiliki tingkat kesulitan yang tinggi. Penelitian ini bertujuan untuk memformulasikan model prediksi kualitas dengan tingkat akurasi yang tinggi pada set data numerik dengan memperhatikan hubungan antar variabel dalam sistem *multi-stage manufacturing*. Dalam penelitian ini, dilakukan kombinasi *principal component analysis* (PCA) dan algoritma klasifikasi C4.5, *naïve bayes* dan *random forest* untuk mencari hasil dari algoritma terbaik. Dari ketiga algoritma tersebut, kemudian dibandingkan berdasarkan nilai *accuracy*, *f-measure* dan *g-mean*. Performa terbaik didapatkan oleh kombinasi PCA dan *random forest* yang menghasilkan *accuracy* 0.96025, *f-measure* 0.96775 dan *g-mean* 0.969793. Kombinasi teknik ini menghasilkan *size of the tree* 145. Kombinasi teknik ini dapat direkomendasikan untuk memformulasikan model prediksi kualitas di MMS dengan atribut bertipe data numerik.

Kata kunci : model prediksi, *data mining*, algoritma klasifikasi, *principal component analysis* (PCA), *multi-stage manufacturing system* (MMS)

## **ABSTRACT**

*Author* : Muhammad Reza  
*Study Program* : Master of Industrial Engineering  
*Title* : FORMULATION OF QUALITY PREDICTION MODEL  
USING PRINCIPAL COMPONENT ANALYSIS AND  
CLASSIFICATION ALGORITHM IN MULTI-STAGE  
MANUFACTURING SYSTEM  
*Counsellor* : Fahmi Arif., S.T., M.T., Ph.D.

*The ability to predict product quality during the production process is an advantage for a manufacturing company in the face of competition. In fact, the formulation of a quality prediction model, especially in multi-stage manufacturing (MMS) systems, is a task that is not simple and has a high level of difficulty. This study aims to formulate a quality prediction model with a high degree of accuracy on numerical data sets by taking into account the relationship between variables in a multi-stage manufacturing system. In this study, a combination of principal component analysis (PCA) and the classification algorithm C4.5, naïve Bayes and random forest was carried out to find the best results from the algorithm. From the three algorithms, then compare them based on accuracy, f-measure and g-mean values. The best performance is obtained by a combination of PCA and random forest which yields an accuracy of 0.96025, f-measure 0.96775 and g-mean 0.969793. The combination of these techniques produces the size of the tree 145. The combination of these techniques can be recommended to formulate a quality prediction model in MMS with attributes of numeric data type.*

*Key words: prediction model, data mining, classification algorithm, principal component analysis (PCA), multi-stage manufacturing system (MMS)*