

## Application of Fuzzy Logic-Enhanced FMEA for Production Risk Management in Flour Mills

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### **Abstract:**

This study investigates the application of a fuzzy logic-enhanced Failure Modes and Effects Analysis (FMEA) model for production risk management in the flour milling industry. Traditional FMEA methods often fall short in handling uncertainties and subjective judgments when assessing failure modes, potentially leading to suboptimal risk prioritization. To address this issue, the research integrates fuzzy logic into the FMEA framework to provide a more nuanced and flexible approach to risk prioritization. The fuzzy logic-enhanced FMEA model was applied in a real-world case study of Nigeria Eagle Flour Mills to evaluate the model's effectiveness in identifying and prioritizing critical failure modes across various stages of the flour production process. The paper compares the traditional and fuzzy FMEA approaches and demonstrate that the fuzzy FMEA model offers more accurate risk prioritization, which facilitates better decision-making for risk mitigation in flour mill operations. The results reveals that critical failure modes such as moisture contamination, dust explosions, and uneven mixing pose the highest risks. Subsequently, recommendations for improving production risk management practices in the flour milling process were provided.

### **Keywords:**

FMEA, Fuzzy Logic, Risk Management, Flour Mill, Production Efficiency.