

# FOOD LOSS RISK ANALYSIS IN THE COCOA SUPPLY CHAIN USING FMEA AND AHP METHODS IN SOUTH SULAWESI INDONESIA

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**BACKGROUND:** Cocoa is one of Indonesia's leading plantation commodities that plays a vital role in the national economy. However, the cocoa supply chain faces significant challenges, particularly the high risk of food loss occurring from production to distribution stages. This issue leads to decreased product quality and quantity, logistics inefficiency, and economic losses for farmers and other supply chain actors. This study aims to identify the types of food loss risks occurring along the cocoa supply chain in South Sulawesi, Indonesia and to formulate strategic recommendations for mitigating these risks using the Failure Mode and Effect Analysis (FMEA) and Analytical Hierarchy Process (AHP) methods.

**METHOD:** The research was conducted through interviews and questionnaires distributed to cocoa farmers, collectors, and traders. Data were analyzed using the FMEA method to calculate the Risk Priority Number (RPN) for each potential failure across supply chain stages. The results were then processed using the AHP method to determine the most effective mitigation strategies based on weighted prioritization.

**RESULTS & DISCUSSION:** The FMEA analysis revealed that the highest risk for farmers was failure to meet cocoa bean quality standards (fermentation, moisture content, and bean size) with an RPN value of 567. For collectors, the main risk was high moisture content in cocoa beans (RPN 315), while for traders, the most critical risk was price fluctuations (RPN 448). Based on the AHP results, the most effective mitigation strategies were: intensive training and direct assistance for farmers (weight 0.664), artificial drying methods using mechanical machines for collectors (weight 0.729), and long-term contract strategies with buyers or business partners for traders (weight 0.682). These strategies effectively reduce food loss risks and enhance supply chain efficiency in the cocoa sector of South Sulawesi, Indonesia.

**CONCLUSION:** The study concludes that the major food loss risks in the cocoa supply chain are associated with quality non-compliance, high moisture levels, and price instability. Implementing intensive training, mechanical drying technology, and long-term contracting are proven to be the most effective strategies to minimize losses and promote a sustainable cocoa supply chain in South Sulawesi, Indonesia.

**KEYWORDS:** FMEA, AHP, Cocoa, food loss, risk management, supply chain.