

# **Application of Material Flow Cost Accounting and System Dynamics Approach for Waste Reduction and Sustainable Food Manufacturing Development in Thailand**

**Jedsada Tipmontian and Ketinun Kittipongpittaya**

Department of Agro-Industry Technology and Management  
Faculty of Agro-Industry  
King Mongkut's University of Technology North Bangkok, Thailand  
[tjedsada@gmail.com](mailto:tjedsada@gmail.com), [ketinun\\_k@hotmail.com](mailto:ketinun_k@hotmail.com)

**Rajmohan Murugesan**

Department of Industrial Engineering  
College of Engineering Guindy, Anna University, India  
[mrajmohan@gmail.com](mailto:mrajmohan@gmail.com)

## **Abstract**

In order to meet the increasing customer demand, higher sausage production capacity is required. However, losses in production can also increase as per the growing marketing demand. The main objective of this research is to reduce losses in sausage production. The study was carried out at food factory in Saraburi Province, Thailand. Material Flow Cost Accounting (MFCA) was applied to analyze the cost of losses occurred at each step of sausage production process. Throughout the MFCA approach, this study started from: (1) definition of elementary station as quantity center of the whole production process: (2) determination of inputs and outputs for each station: (3) analysis of mass balance for each station (4) conversion of energy use, depreciation, labor requirement, raw material usage, and waste disposal into monetary terms. The study found that sawdust smoking process was the highest significant loss so that it was replaced by the liquid smoking system. Then, System Dynamics was applied for Long term operation analysis. The result of this study helps the company reduces waste and saves cost more than 150,000 US dollars per year.

## **Keywords**

Material Flow Cost Accounting, Food Industry, Sausage Production, System Dynamics

## **Biography**

**Jedsada Tipmontian** is a lecturer, Department of Agro-Industry Technology and Management He is also serving as Vice Dean, and Chair for Cooperative & Work-Integrated Education Program, Faculty of Agro-Industry, King Mongkut's University of Technology North Bangkok (KMUTNB), Thailand. He received a Bachelor's degree in Agro-Industry from Prince of Songkla University, Thailand. He holds a Master degree of Engineering in Industrial Engineering from KMUTNB. He completed Certificate program in Industrial Engineering & Management from Asian Institute of Technology, Thailand. He completed PhD (Thesis Title: "Risk Modelling of Agro-Industrial Supply Chains in Asian Countries") at Department of Industrial Engineering, Anna University (AU), Chennai, India.

Before joining KMUTNB as a faculty member, he worked for fruit industry, frozen seafood industry and fresh food logistics business. Tipmontian's research interests include Food Supply Chain Risk Management, Food Business Management and Operation Analytics, Statistical and Fuzzy Quality Control, System Dynamics Simulation and Multi-Criteria Decision Models for solving problems in Agro-Industry.

**Ketinun Kittipongpittaya** is currently a fulltime lecturer in Faculty of Agro-Industry at King Mongkut's University of Technology North Bangkok, Thailand. She received her B.Sc. and M.Sc. in Food technology from Chulalongkorn University, Thailand and earned Ph.D. in Food science from University of Massachusetts, Amherst, USA. She has taught courses in food chemistry, food processing, and food analysis. Her research focuses on minor components in food oils and their impact on lipid oxidation.

**Rajmohan Murugesan** is an associate professor, Department of Industrial Engineering, College of Engineering Guindy, Anna University, Chennai, India. He holds B.E. in Agricultural Engineering, College of Agricultural Engineering, Tamilnadu Agricultural University and M.E. in Industrial Engineering, College of Engineering, Guindy, Anna University, Chennai. He completed PhD in Logistics and Supply Chain Management from Faculty of Mechanical Engineering, College of Engineering, Guindy, Anna University, Chennai (Thesis Title: Meta Heuristics Solutions for Vehicle Routing Problem with Time Windows in Supply Chain Management). He has published in various different international and national journals. His areas of specialization include Logistics and Supply Chain Management, Industrial Engineering, Design of Experiment, and, Metaheuristics. Moreover, he is serving as a reviewer in various journals in the above areas.