Export Demand Estimation of Thai Rice by Using Artificial Neural Network Model

Adcharawadee Keawwandee and Chakthong Thongchattu
Department of Industrial Engineering, School of Engineering
University of Phayao
Phayao, Thailand
adcharawadee@hotmail.com, iengin8@gmail.com

Asawin Pasutham
Business School, University of Thai Chamber of Commerce
Bangkok, Thailand
asawin_pas@utcc.ac.th

Abstract

Globally, Thailand have been one of the top 5 rice exporting countries and Thai rice is also known as fragrant rice. Over the past 5 years, Thailand have exported rice approximately 8.46 million tons per year to major export partners such as China, Japan, the United States, and the European Union. However, the patterns of Thailand's rice exports quantity have illustrated the variation and instability which cause of inaccurate forecasts. The aim of this study is to propose the forecasting solutions by determining the significant trends and analyzing the affecting factors of Thailand's rice exports. The proposed model explores 4 forecasting techniques including Backpropagation Neural Network (BPNN), Holt-Winters (HW), Multiple Regression (MR), and Exponential Smoothing (ES). Therefore, the results reveal that Backpropagation Neural Network is the optimal solution and data correlation is 0.87. The three impact factors are Interest rate, Exchange rate, and Tapioca price influencing Thai rice export significantly. Ultimately, the results of this study emphasize the importance of demand forecasting to estimate and predict consumers' future demand with a purpose for making better-informed supply decisions as well as enhancing total system effectiveness of supply chain in the competitive market and unpredictable environment for the future of rice production and consumption.

Keywords
Food Supply Chain, Neural Network, Demand Estimation, Thai Rice

Biographies
Adcharawadee Keawwandee, Ph.D. is lecturer in the Department of Industrial Engineering, School of Engineering at University of Phayao, Thailand since 2002. She also served as the associate dean for Academic Affair at School of Engineering from 2016-2020. For academic background, she earned B.Eng. in Industrial Engineering from Naresuan University, Thailand, M.Eng. in Industrial Engineering and Management from Chulalongkorn University, Thailand, and Ph.D. in Industrial and Systems Engineering from University of Oklahoma, U.S.A. in 2015. She has published national and international conference papers. Her research interests include entrepreneurship and innovation management, product development, quality management, optimization, project management, and six sigma & lean manufacturing. She is a Certified Lean Six Sigma Green Belt, and she has been recognized as a professional management consultant in working with local businesses since she started her professional career.

Chakthong Thongchattu is lecturer in the Department of Industrial Engineering, School of Engineering at the University of Phayao, Thailand. He attended as the innovation and business consultant at social innovation driving unit from 2020-2022. He earned B.Eng. in Industrial Engineering and M.Eng. in Manufacturing Engineering from Naresuan University, Thailand. His research interests include data analytics and innovation management, product development, and six sigma. He is a Certified data analytics and social innovation design.

Asawin Pasutham, Ph.D. is lecturer in the Department of Logistics Management, Business School at University of Thai Chamber of Commerce, Bangkok, Thailand since 1998. He presently is the Director of School of Continuing Education Establish Project. He earned Ph.D. in Operations Management from Aston University, Birmingham, U.K. in 2011. He has published several national and international conference papers. His research interests include Logistics and Supply Chain Management. Also, he worked with local businesses as a professional management consultant.