

Cassava Transportation Planning under Uncertain Demand using Hybrid Algorithm : Case study of Roi Et Province

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Abstract. Cassava transportation planning usually involves unexpected demand, which may result in shortage supply. Furthermore, a distribution center at which cassava is collected is difficult to be located since the demand is unknown. In this research, hybrid forecasting model for predicting future demand in order to determine transshipment points is proposed. In addition, cluster analysis and particle swarm optimization are used for creating potential zones and determine a proper location as a new hub. Finally, the optimal value of a transportation network model using both forecasted value and actual value obtained from linear programming technique are tested and compared. The results indicate that the hybrid forecasting model provides the lowest error and forecasting value provides average error of optimal value compared to actual value by 19.81%. Moreover, zoning technique can be able to improve shipping volume fulfilled to a large truck.

Introduction

Thailand is an Asian country that plays important roles both producer and exporter in the international agricultural market. The agricultural exports are the major Thailand's income as the Thailand's main occupation is agriculture. However, the commercial competitions of agricultural exports are more competitive in the present. Hence, there are many strategies in order to support and improve the agricultural products such as developing new products that can resist pests or provide the good test, improve the production process and harvest process, enhance logistics, and so forth. Thailand's cassava export [1] is the number one in the world and it is used in many cassava industries such as cassava flour, ethanol, animal feed, and so forth. According to Office of Agricultural Economic (OAE) website, there are 8,359,615 Rai for cultivating of cassava in 2012. About 6,955,305 metric ton is exported, which is equivalent to 65,194 million Baht. Recently, there have still been many problems concerning with cassava processes that are limited for Thailand's commercial competition. Logistic management is one of those problems of cassava process in Thailand [1] regarding of uncertain products and low volume for shipment using large truck. In addition, uncertain demand of cassava flour industries for transportation planning is taken into account. In this research, cluster analysis and particle swarm optimization [2, 3] are used for defining zone and determining the suitable location as hubs in order to collect products from each district to pile up for transshipment volume. Results from hybrid forecasting model [7, 8, 9, and 10] for predicting the future demand in order to improve sale and transportation planning [4, 5 and 6] are presented and discussed.

Numerical Data

In this research, both fact data and assumed data are applied in order to investigate the scenarios as similar to as real situation. The scopes of the research are presented as the follows: