

Use of Transportation Networks to Optimize The Profit Dynamics of the Product Distribution

Authors : S. Jayasinghe, R. B. N. Dissanayake

Abstract : Optimization modelling together with the Network models and Linear Programming techniques is a powerful tool in problem solving and decision making in real world applications. This study developed a mathematical model to optimize the net profit by minimizing the transportation cost. This model focuses the transportation among decentralized production plants to a centralized distribution centre and then the distribution among island wide agencies considering the customer satisfaction as a requirement. This company produces basically 9 types of food items with 82 different varieties and 4 types of non-food items with 34 different varieties. Among 6 production plants, 4 were located near the city of Mawanella and the other 2 were located in Galewala and Anuradhapura cities which are 80 km and 150 km away from Mawanella respectively. The warehouse located in the Mawanella was the main production plant and also the only distribution plant. This plant distributes manufactured products to 39 agencies island-wide. The average values and average amount of the goods for 6 consecutive months from May 2013 to October 2013 were collected and then average demand values were calculated. The following constraints are used as the necessary requirement to satisfy the optimum condition of the model; there was one source, 39 destinations and supply and demand for all the agencies are equal. Using transport cost for a kilometer, total transport cost was calculated. Then the model was formulated using distance and flow of the distribution. Network optimization and linear programming techniques were used to originate the model while excel solver is used in solving. Results showed that company requires total transport cost of Rs. 146, 943, 034.50 to fulfil the customers' requirement for a month. This is very much less when compared with data without using the model. Model also proved that company can reduce their transportation cost by 6% when distributing to island-wide customers. Company generally satisfies their customers' requirements by 85%. This satisfaction can be increased up to 97% by using this model. Therefore this model can be used by other similar companies in order to reduce the transportation cost.

Keywords : mathematical model, network optimization, linear programming

Conference Title : ICNGCO 2015 : International Conference on Network Games, Control and Optimization

Conference Location : Copenhagen, Denmark

Conference Dates : June 11-12, 2015