



Application of a Grey Markov GM (1, 1) model for demand forecasting in the supply chain

Francisco Trejo^[0000-0002-2662-0609] and Rafael Torres Escobar^[0000-0002-8368-3948]

¹ Universidad Anáhuac México. Engineering Faculty. Huixquilucan, 52786, Mexico. francisco_trejo@anahuac.mx

² Universidad Anáhuac México. Engineering Faculty. Huixquilucan, 52786, Mexico. rafael.torrese@anahuac.mx

Abstract. A Grey system is a system containing grey inputs and grey or regular outputs. Grey information could be further explained as limited valuable sequence data, grey number information and grey system structures. Surprisingly, none of these models have been applied in the supply chain area. A grey model based on limited data is a new type of forecasting model for solving prediction problems based on limited valuable sequence data. In traditional statistical forecasting models, data must meet the requirement of scale, i.e., large scale of data should be collected. This condition could not always be satisfied. This is not always possible when you plan to forecast the demand in supply chain. In this paper we present a methodology for incorporating limited or incomplete data into a modified GM (1,1) model applied in the supply chain area. We have found that this model can obtain better prediction results, especially for data of small sample sizes (at least 30 records). The results obtained exceed other models and methodologies such as: linear regression, moving averages, exponential smoothing and are applied where ARIMA is not possible, since the stationary condition in GST is not required for data samples below 20 records. The evaluation methodology was implemented by using Minitab and R. The results by using the GM (1,1) are better than the results of the linear regression and moving averages, 2.28% vs 3.97% respectively for forecasting warehouse space for a 3PL company. The results show that the prediction ability of the grey prediction with GM (1,1) model is better than traditional approach.

Keywords: Grey Systems, Supply Chain, Forecasting.

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