

Management Science Seminar

Costing the bullwhip effect in supply chains

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Time: 1pm to 2pm
Room: Lecture Theatre 7

Abstract: The bullwhip effect is a costly supply chain phenomenon, but bullwhip related costs are not generally incorporated into the design of replenishment systems. Traditionally replenishment systems are designed to minimise inventory related costs only. Here we assume bullwhip related costs consist of lost capacity and over-time costs. We develop an easy-to-use design method to tune replenishment decisions in the face both of inventory and bullwhip related costs.

To illustrate our method we investigate the value of a lead-time reduction in terms of inventory and capacity costs. This may be useful in global outsourcing decisions. We also investigate the economic impact of a common control theory technique (the proportional feedback controller) used in the Order-Up-To policy. This may be useful when assessing the design of replenishment or scheduling systems.

Our analytical investigations exploited z-transforms and probability density functions. The results of this investigation form the basis of our design method which we have realised via a look-up table to avoid complex functions. However, we have also incorporated our results into a mobile phone and a small Visual Basic program to run on a PC. The method can also be readily incorporated into spreadsheets for use by analysts.

Please bring a calculator (or mobile phone) and pencil to the presentation if you would like to try the method!

Bio: Dr Stephen Disney is a Senior Lecturer in Operations Management at Cardiff Business School. Stephen's research interests consist of the dynamic and economic performance of supply chains.