

Summary

"The amateurs discuss tactics: the professionals discuss logistics."

- Napoleon -

In this literature research, I have focussed my attention on a phenomenon known as the 'Bullwhip effect'. The Bullwhip effect refers to the increase of variance perceived in the consumer's orders as they are passed upstream along a supply chain. My goal was to describe the Bullwhip effect and determine possibilities to reduce the amplification of this variance of perceived consumer demand.

After an initial analysis using the Delft System Approach, it was found that the root of the problem lies in the local and global control functions of the supply chain. Traditional local policies of forecasting and ordering were examined and this knowledge was used to investigate the causes of the Bullwhip effect listed by many researchers.

Since the root of the problem was found to lie with the local and global control functions, improvements were sought for these functions. On a local level, ordering and forecasting policies can be improved by the use of techniques from the field of control theory. The application of PID control and other control techniques has been shown to lead to a great improvement over the traditional (s, S) ordering policy.

On a global level, sharing the retailers information on consumer demand leads to a large reduction of the Bullwhip effect. It will however never fully remove the effect because of the lead times inherent in the system. Because the retailer does not have to deal with information distortion, he has no incentive to share his information. It is therefore necessary to introduce the concept of side payments. Game theory can be used to determine the height of these payments. This indirectly calculates the worth of this information to the other members of the supply chain and can give the retailer a good starting point for possible negotiations on the height of the side payments.

When implementing these countermeasures to the Bullwhip effect, it is very important to realise they are theoretical results which cannot be applied directly into real-world systems. For example, PID controllers will need some form of function control which monitors if the assumptions made when constructing the controller are still applicable. In the case of information sharing, it is important to realise that just sharing data will not provide any benefits. Inventory policies will need to be adjusted to synergize with all partners in the supply chain in order to reap the benefits of information sharing.