

How to Reduce Impact of Bullwhip Effect in Small Scale Industry: A Case Study

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Abstract— The issues related to bullwhip effect have been studied rigorously in past, Even before the advent of supply chain. In this research we studied that how to reduces impact of bullwhip effect in small scale industries. In supply Chain Management the phenomenon of bullwhip effect can never be ignored because bullwhip effect is directly affected the supply chain. We also discuss that the how to control and reduce the information distortion, when orders move Consumer to Shop Retailer (Upstream or Downstream). In research analysis we discuss the four major causes of the bullwhip effect, Demand forecast, Price fluctuation, Order Quantity and Shortage Gaming. If we decrease the bullwhip effect then we increase the growth of the industries and also increase the efficiency of the industries.

Key words: Bullwhip Effect, Supply Chain Management, Demand Forecasting, Order Batching, Price Fluctuation, Shortage Gaming

I. INTRODUCTION

Bullwhip Effect is a effect of a demand fluctuations is amplified widespread in the supply chain, The Information distortion phenomenon is called the Bullwhip Effect. In global economic integration, in order to survive in global market scenario. Bullwhip effect is a dynamic phenomenon in supply chain. In this supply chain included, supply, production and sales. Order rates are increases while order sending is upstream like Consumer – Retailer, Retailer – Wholesaler, Wholesaler – Producer. As shown in fig 1 Supply Chain Structure. Variability in order sending or information flow creates bullwhip effect, sometimes the consumer demand increases then we required to maintain the safety stock in our industry or supply chain. High variable demand also increases lead – times. Bullwhip creates unstable production schedules. These unstable production schedules are the cause of range of unnecessary costs in supply chains. Solar industries is one of the fastest growing and the most competitive industries in India, if its supply chain can be managed efficiently, there is no doubt it will make a huge contribution to Indian market.

II. LITERATURE REVIEW

The Bullwhip Effect happens in many companies. The famous case which happened in Procter & Gamble (P&G) and Hewlett-Packard (HP) provide good understandings of the bullwhip effect. Forrester (1958), Hussain and Drake (2011) , both are the pointed the information distortion in supply chain while according to lee et al.(1997) , there are four major causes of bullwhip effect.

- 1) Demand forecasting
- 2) Order Batching
- 3) Price Fluctuation
- 4) Rationing and Shortage Game

Sterman (1989) have the insight of modification in the individual education can help to mitigate the bullwhip effect.

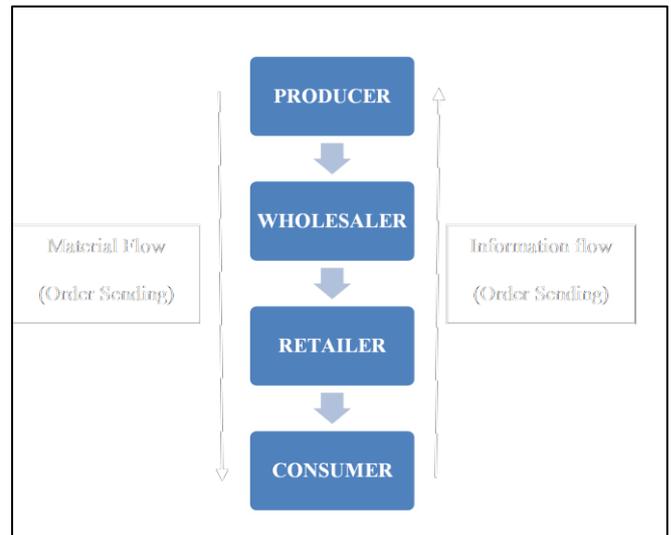


Fig. 1: Supply chain Structure

The study of this subject cannot goon without the review of related literature , different literatures were reviewed which include Lee et al.(1997a b),Sucky (2009) , Agrawal et al.(2007), Croson and Donohue (2006), Hussain and Drake (2011), Dejonckheera et al.(2002). The reason for choose from scientific database of academic publications and journals from the internet. The literatures were helped in identifying different methods that could be used indentify the cause of bullwhip effect, the impact of the bullwhip effect and formulate recommendations to damping the bullwhip effect. Fig 2 shows that the bullwhip

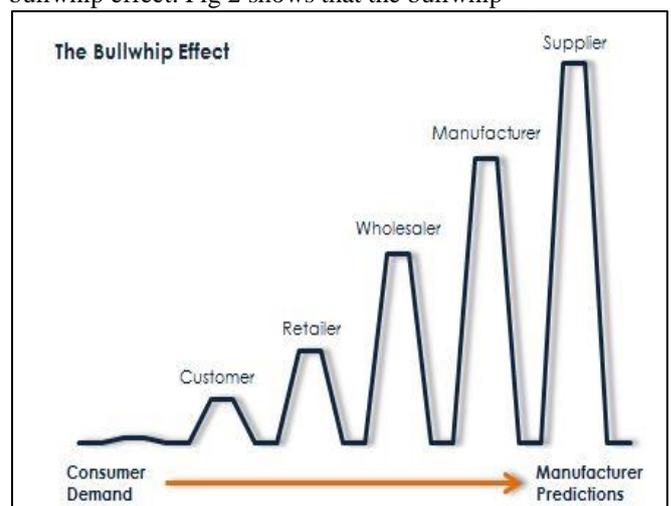


Fig. 2: Effect in supply chain

III. RESEARCH OBJECTIVE

The overall aim of this research is to increase the understanding of the bullwhip effect and help to minimize the impacts of it in small scale industries.

Identify the causes and impacts of the bullwhip effects in solar appliance industry (small scale industry).

Evaluate critically the solar appliance Industry to control and reduce the bullwhip effect.

IV. FINDINGS OF THE BULLWHIP EFFECT

The bullwhip effect is occurred during information sharing from downstream to upstream. The worse the information sharing between suppliers and customers does, the bigger influences caused by the bullwhip effect will be. If the bullwhip effect increases than the cost of manufacturing also affected, also affect the distribution channel of the supply chain. Hussain and Drake (2011) have summed the impacts of the bullwhip effect up in three aspects, which are

- 1) Inaccurate forecasting which may cause periods of low capacity utilization or periods of having no enough capacity
- 2) Inadequate customer service
- 3) High Inventory cost.

V. REDUCING IMPACT OF THE BULLWHIP EFFECT

A. Avoiding multiple updates

In industry the first cause lead to the bullwhip effect includes no visibility of end demands, multiple forecasts and long lead time therefore, reducing lead-time, accessing sell through data and information on inventory status, and only single control replenishment can be good solution to this issue.

B. Break order Batches

Random or correlated ordering , high order cost and full truck load (FTL) economics are the main reasons cause the bullwhip effect . Thus discount on the assorted truckload, consolidation by third party logistics and regular delivery appointment are the solution to the bullwhip effect.

C. Stabilize Prices

Price fluctuation is also the main cause of the bullwhip effect. The high-low pricing, delivery and purchase synchronized can causes the fluctuating prices, to reduce the frequency and the level of wholesale price, discounting is the simplest way to control the bullwhip effect

D. Eliminate Gaming in Shortage

The cause of shortage game is proportional rationing, ignorance of supply conditions and unrestricted order and free return policy. To eliminate gaming in shortage, generally trust and good relation of the various stages in supply chains can reduce duplication of effort and reduce transaction costs, while leading a reduction in the bullwhip effect.

Cause of bullwhip Effect	Factors Affecting	Solution for Reducing its impact
Demand Forecasting	Increase lead time Additional forecasting	Decreasing lead time Single controlling

Order Batching	Random ordering High order cost	Regular delivery appointment Electronic Data Exchange
Price Fluctuation	Unsynchronized delivery and purchase	Everyday low price
Rationing and Shortage Gaming	Ignorance of supply Unrestricted orders	Flexibility limited overtime and capacity reservation Shared capacity and information

Table 1: shows Cause and Solution of Bullwhip Effect

VI. SOME OTHER MEASURES TO MITIGATE THE BULLWHIP EFFECT

- 1) Information sharing
- 2) Just in time
- 3) Just in time Purchase
- 4) Just in time Delivery
- 5) Just in time Distribution
- 6) Overall every control and clear management
- 7) Inventory Management

VII. CONCLUSION & FUTURE SCOPE

The impacts of bullwhip effects to the enterprises are self explanatory; sometimes it even has serious influence. Because of the bad demand forecast , manufactures often pay the excessive material cost or shortage of raw material , extra manufacture cost , overtime cost , excessive inventory cost leaded by high inventory level and backlog funds. The bullwhip effect made enterprises keep a higher inventory level than actual demands, which arisen the manage risks and weaken the firm's competitiveness. Meanwhile, it also lowers the operation efficiency of the entire supply chain. The overall every control and clear management which created by solar industry is also used to improve its performance on the supply chain management. Vendor inventory management is another important strategy of industries to gain and control the bullwhip effect.

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