Reducing the Bullwhip Effect via Market Research-Gleaned Insights

Surveys, focus groups and interviews can identify the sources of costly variations in demand signals up and down the supply chain.

**Executive Summary**

In an ideal world, supply chains would be in equilibrium. At every link in the chain, each participant would be armed with accurate information about demand and inventory, enabling them to make rational choices and order only what they needed at any time.

In the real world, however, buyers often have outdated or inaccurate information about demand trends. Caught between the twin threats of excess inventory and empty shelves, they guess or hedge their bets based on the supplier’s past performance at meeting delivery promises. Fearful of shortages, they intentionally over-order if free returns make it easy for them to do so.

The resulting and increasingly inaccurate order activity is called “the bullwhip effect” because minor variations are amplified as they move up the supply chain, costing material suppliers, manufacturers, distributors and retailers an estimated millions of dollars a year.

When manufacturers, distributors and retailers over-order, they tie up excess capital in inventory, and are forced to discard perishable raw materials they don’t need or pay inflated prices for inventory (and its shipping and storage) to meet demand that doesn’t exist. If they under-order, they lose sales when customers turn away from their bare shelves to a competitor, or lose profit by paying premium shipping and production rates to meet demand.

Players throughout the supply chain use a variety of methods to reduce the bullwhip effect, ranging from new technology, to changes in the terms and conditions they offer customers. However, these fixes often do not work because they are not aimed at the decision-makers whose actions do the most harm.

Market research can help business leaders understand the needs, desires, fears and assumptions of consumers at the end of the supply chain, but it can also serve a higher purpose. Market research can identify the stakeholders who contribute the most to the bullwhip effect and understand why they act as they do. These insights can help companies create customized solutions with a higher return on investment than scattershot efforts to remediate the bullwhip effect. By focusing on the most critical causes of the bullwhip effect, organizations can save time and money and reduce the most inefficient behaviors most quickly.
Market Research at Work

While many factors contribute to the bullwhip effect, all are initiated by humans.

By using analytics-driven market research, we can understand why various supply chain players act as they do. We can also test their reactions to new policies, business practices and technologies to determine which are most cost-effective at reducing the bullwhip effect.

The first step often involves primary market research techniques such as conversations (focus group interviews) and small-scale surveys to make “informed guesses” about the roles of various actors. These are generally followed by more extensive surveys to validate these preliminary conclusions among a larger group of stakeholders. These follow-up surveys can also uncover more detailed insights, such as exactly which decision-makers are most likely to misuse free return policies, what level of discounts might reduce order batching or which decision-makers (such as senior executives) are most likely to get accurate information about demand and inventories.

Here are five common causes of the bullwhip effect, possible solutions to them, and examples of how market research findings can help an organization understand the reasons for the distortion and identify the best possible remedies.

**Bullwhip Scenario #1: Individual fears trump organizational efficiency**

- **Cause:** If an organization has been hurt by over- or under-ordering in the past, it is only natural for a purchasing or procurement manager (especially one who replaced an unsuccessful predecessor) to overreact in the other direction. While these actions protect the decision-maker in the short term, they lead to excess costs in the form of excess inventories or stock-outs (see sidebar, next page).

  - **Remediations:** Deemphasize target-based planning, or change those targets to reach a better balance between the cost of excess inventory vs. the cost of stock-outs. Educate decision-makers on the broader effects of their decisions, and consider changes in compensation or evaluation practices to reinforce more efficient choices.

  - **How market research can help:** Because such intentional “fudging” of orders might be embarrassing or even harmful to employees, their motivations might be best identified through focus groups or polls in which responses are kept anonymous. Informal primary market research (such as conversations or focus groups) with suppliers or former employees might uncover likely theories to test in broader follow-up surveys. With this
Quick Take

Queries that Counter the Bullwhip Effect

A short market research study can help organizations focus their efforts on reducing the bullwhip effect. Among the questions that could be asked in a qualitative review are:

- **What are the various factors** (e.g., previous month’s sales, increased sales of competitors’ products, etc.) that customers consider when ordering a product? Which of these factors was most important, and why? What circumstances make one of these factors more or less important in setting order levels?

- **For how long does the customer prefer to accumulate demand** rather than order periodically? For given products, intermediate goods or raw materials, what factors lead customers to either accumulate demand or order more frequently? What changes would make it more likely for customers to order more frequently; i.e., how much would order processing or shipping costs have to decline to make more timely and accurate ordering worthwhile?

- **Describe recent cases where the customer faced an over- or understock situation.** What caused these? Did the customer face any negative consequences as a result? If not, who else in the organization may have?

- **How well do individuals one level up in the supply chain share accurate and timely demand information?** What specific types of information are most, and least, accurate?

- **Can the customer identify any factors** (time of year, type of product, level of detail, level of stakeholder making the request) that tend to result in higher or lower quality data that affect order levels?

- **What are the main barriers** that prevent the flow of accurate information? Are they more, or less, severe than at other organizations at which the customer worked, or is familiar with? Why?

- **How can the communication channel be improved** to enhance demand forecasting? What tools or processes are available, or what has the customer used previously, that would improve such forecasting?

- **What are the various factors** (i.e., free return policies, price variations, etc.) that cause the most excessive variation in demand for product “X,” work in progress “Y” or raw material “Z”?

- **What incentives** (financial, career advancement, job satisfaction, workplace quality) would make the customer most likely to change behavior “X” (over-ordering, order-batching, etc.)?

- **Remediations:** Set production or inventory targets based on activity that is closer to the customer and thus more accurately reflects markets trends.

  Implement or upgrade ERP systems to make it easier to share information and adjust compensation to reward information-sharing.

- **How market research can help:** Primary research (informal interviews) can probe for “horror stories” or anecdotes that might hint at more systemic problems. Surveys can ask decision-makers at each link in the supply chain how well their demand is met by those further down the chain. Such surveys can provide more granular insights through detailed questions about the size, composition, timeliness and quality of the goods or raw materials received at each link in the supply chain.

- **Bullwhip Scenario #2: Lack of adequate and timely information about demand trends**

  - **Cause:** While a store manager may sense a shift in fashion or demand long before a district manager or supplier does, such information is often not shared due to a lack of proper systems, processes and/or corporate culture. The older the information, the greater the potential distortion as decisions based on it ripple through the supply chain.

  Information, organizations can identify specifically who within the supply chain intentionally under- or over-orders and why. They can also “test,” just as in product-oriented market research, which combination of new systems, incentives and messaging is most likely to reduce their inefficient behavior.
supply chain. They can also gather insights into where new systems, retraining or policies will produce the greatest impact.

**Bullwhip Scenario #3: Free return policies allow customers to “game” the system**

- **Cause:** Customers intentionally over-order to avoid shortages, canceling their orders when supply becomes adequate. Free return policies allow them to escape any penalty for such behavior, but leave manufacturers and distributors financing what is, in effect, emergency stock for retailers or distributors.

  - **Remediation:** Adjust or eliminate such policies.

  - **How market research can help:** Surveys or focus groups of customers can identify how often, and to what extent, such policies encourage excess ordering, and which customers are the worst offenders. Field trials with follow-up surveys can assess how well the elimination or modification of such policies reduces the inefficiencies caused by the bullwhip effect.

**Bullwhip Scenario #4: Order batching to cut processing and shipping costs**

- **Cause:** Customers accumulate demand before placing an order to minimize the time and cost of order processing or of shipping partial truckloads. This creates excess variability for suppliers, especially when a market experiences rapid, short-term changes in demand.

  - **Remediation:** Implement EDI- or ERP/cloud-based systems that reduce the cost of placing orders. It’s also effective to size future orders based on the actual last three months of sales. Incentives/penalties can be created to discourage order batching.

  - **How market research can help:** Informal conversations and focus groups can help identify which factors (order processing or shipping costs) are most important for different types of customers. Quantitative research can identify the exact level of incentives or penalties that would most effectively reduce order batching for an organization’s most important customers.

**Bullwhip Scenario #5: Price fluctuations**

- **Cause:** Special discounts and other price changes can cause buyers to either rush or postpone their purchases to get the best price. Because these changes are not tied to underlying, long-term demand, they can cause uneven production and inventory spikes (see sidebar).

  - **Remediation:** Improve communication between internal functions such as production and marketing to better identify true demand levels. Obtain better information about external events, such as weather, strikes or political upheaval, that can produce short-term price distortions.

  - **How market research can help:** Primary research may include interviews on specific

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**Quick Take**

**Bullwhip Effect: Oversupply Resulting from Lack of Internal Communication**

When Volvo found itself with extra inventory of electric cars, its sales organization offered special deals. This cleared the inventory, but at the cost of reduced profits.

Production, unaware of the price cut, assumed the increase in sales was the result of underlying demand and ramped up production of electric cars. This created another oversupply of electric cars, which the automaker had just sacrificed profit margins to reduce.¹

**Bullwhip Effect: Excess Inventory Resulting from Expected Shortages**

Several months after Cisco struggled to deliver enough products to customers, it faced the opposite problem: $2.2 million in excess inventory that had to be written down.

The reason, according to a supplier quoted in *CIO Magazine*, was fear of being caught short again. “Procurement needs 100 of a part, but they know if they ask for 100, they’ll get 80. So they ask for 120 to get 100,” said the supplier. “People see a shortage and intuitively they forecast higher.”²
events that lead to over- or under-ordering to uncover deeper, more systemic problems. Correlating historical data on price changes with over- or under-ordering can identify which specific price changes triggered the bullwhip effect among specific decision-makers. Follow-up surveys can draw out more subtle factors such as how large of a price change triggers a change in buying behavior. Field trials can test which kinds of internal communication would do the most to reduce the bullwhip effect.

Looking Ahead: Next Steps

With slow, uncertain growth in global economies, producers and suppliers at each link in the supply chain cannot afford to lose sales and market share by under-ordering. Nor they can afford the extra expense of rush shipments or peak prices for raw materials to meet unexpected demand.

Whether it’s a supplier, manufacturer, distributor or retailer, no link in the supply chain can afford guesswork, fudging, hopes or old data when placing or filling orders. When conventional remediation techniques fail to reduce the bullwhip effect, market research can help uncover the hidden needs, desires, fears and assumptions that are actually to blame.

Footnotes


References


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About the Authors

Neerad Gupta is a Senior Manager with Cognizant Analytics. He has more than 13 years of experience in consulting, market planning and marketing research, conducting research and advising top tier companies in domains such as retail, consumer goods and life sciences. He has spent considerable time on both commercial and marketing analytics, including multi-channel optimization; brand lifecycle management; consumer insights, behavior, satisfaction; and sales force effectiveness. Neerad holds an M.B.A. in marketing and systems from Indian Institute of Planning and Management, New Delhi, and a bachelor of pharmacy from CCS University, Meerut. He can be reached at Neerad.Gupta@cognizant.com.

Saurabh Arora is a Senior Associate with Cognizant Analytics, where he has spent more than six years of experience analyzing data and solving quantitatively challenging business problems. Saurabh has worked on a variety of projects involving market research, model monitoring, segmentation and sales management for clients from varied industries in the U.S. and Europe. He holds an M.B.A. degree from the Indian Institute of Foreign Trade, New Delhi, and a bachelor of statistics degree from Delhi University. Saurabh can be reached at Saurabh.Arora2@cognizant.com.

Himanshu Mittal is a Senior Associate with Cognizant Analytics, where he has spent more than six years of experience in data analytics and consumer insight. He has extensive experience solving client problems and generating customer insights in areas including customer satisfaction, brand image tracking, brand perception, market segmentation, pricing, market sizing and consumer behavior. Himanshu holds an M.B.A. degree in marketing from the Narsee Monjee Institute of Management Studies, Mumbai, and is a Chemical Engineering Gold Medalist from U.P. Technical University, Lucknow. Himanshu can be reached at Himanshu.Mittal@cognizant.com.