

How Transparency and Collaboration Revolutionised Supply Chain Management



V. "Paddy" Padmanabhan

Professor of Marketing

Padmanabhan's impact in brief

- ▶ Padmanabhan's research into the Bullwhip effect revolutionised the way organisations approached supply chains. His understated ability to crystallise complex issues helped managers understand the cause, impact and remedies for the large fluctuations in supply chains that hobble entire industries.
- ▶ His papers are held up among the most authoritative and influential contributions of the field in the last 50 years and formed the basis of dozens of new research streams.
- ▶ His work sparked the creation of collaborative and information-sharing strategies, modern day supply chain information systems, enterprise resource planning (ERP) and has been influential in the blockchain movement.
- ▶ Padmanabhan now coaches some of the world's leading CEOs as well as leaders of start-ups across Asia, North America, South America and Europe.

Until a few decades ago, managers thought the "bullwhip effect" was a fact of life. The phenomenon, whereby small fluctuations in retail demand cause large fluctuations in demand further up the supply chain, caused headaches for suppliers and distributors the world over.

The cause of the phenomenon, which remains a painful reality for many organisations, was first noted by Paddy Padmanabhan, The Unilever Chaired Professor of Marketing at INSEAD. His 1997 paper [Information Distortion in the Supply Chain: The Bullwhip Effect](#) is among the 10 most influential papers in the first 50 years of Management Science, one of the most prestigious journals in the field of management today.

The bullwhip research completely changed industry's approach to supply chain management, providing a simple explanation for the way in which a small change in customer demand can result in large swings in orders further up the supply chain. By showing how the effect can be mitigated through collaborative and information-sharing strategies his papers have helped industry save billions of dollars a year in excessive inventory investment, misguided capacity plans, ineffective transportation, and missed production schedules.

"It completely changed the way we and our customers were thinking about collaboration and the conversations we had," said Gianpaolo Callioni, e2e Analytics partner and former Director of Strategic Planning and Modelling, Hewlett-Packard.

"Rather than seeing ourselves as independent players in a zero-sum game, the concept helped companies better understand the implications of their actions on the supply chain."

Triggering a movement towards greater transparency

Co-authored with Stanford University's Operations, Information and Technology Professors, Hau L. Lee, and Seungjin Whang, Padmanabhan's paper and a second more industry-focused publication, [The Bullwhip Effect in the Supply Chain](#), had an immediate impact on both academics and practitioners. Just four months after their release, Hewlett-Packard's inventory management team began drawing from the new ideas to design and implement a pilot program for automatic inventory replenishment.

“It was the start of a movement,” Callioni noted. “Once we understood what was happening, we were able to seek ways to work with our suppliers and customers to smooth out the spikes (in our supply chain) in a logical and intelligent way.”

The papers spurred a surge of research into supply chain management as academics sought to quantify the magnitude of the bullwhip phenomenon, first using analytical models and later empirically, using industry-level or company-specific data. Many emerging scholars, including Martin Lariviere, John L. and Helen Kellogg Professor of Operations and Chair of Operations Department at Kellogg School of Management, built up their research portfolio by expanding on the bullwhip findings, considering each of the four causes identified in the original paper.

Simplicity and clarity

The power of the bullwhip papers has been attributed to their clarity and ability to crystallise the cause, impact and remedies for the demand variance phenomenon in a way that is easy to understand.

“The authors provided concrete examples and concrete links between cause and countermeasure. They presented not just an issue but a template to make things better.” said Lariviere.

The term ‘bullwhip’ is now embedded in business vernacular having been used in *The Wall Street Journal* to **explain** firms’ challenges in the wake of the global financial crisis and, more recently, in *Harvard Business Review* to **describe** the impact of China’s economic slowdown on global supply chains.

“They hit on a concept that business cares about”

The relevance of the research and its practical impact was no accident. When Padmanabhan, Lee and Whang embarked on joint research to improve coordination in the manufacturing and retailing sectors, they made a conscious decision to go into firms and speak directly

“Rather than seeing ourselves as independent players in a zero-sum game, the concept helped companies better understand the implications of their actions on the supply chain.”

with industry leaders to identify their greatest challenges. At P&G, an executive complained that amplification of demand variability was creating a “bullwhip” which was virtually paralysing the company. Padmanabhan and his colleagues soon realised this problem was ubiquitous across industries and was having a significant impact on profits.

“The authors provided concrete examples and concrete links between cause and countermeasure.

They presented not just an issue but a template to make things better.

“Industry believed the challenge came from extraneous forces outside their control,” Padmanabhan noted. “We showed that there was a simple explanation for what was happening, and that it could be addressed.”

Following its 2001 \$2.1 billion inventory write-off, Cisco Systems adapted ideas from the paper to develop “e-Hub”, a global collaborative supply chain network which became critical to the company’s recovery and future success. Likewise, the LaserJet group at HP used concepts from the papers to identify links in their supply chain with large bullwhip factors and worked with these players to reduce them. Other firms like Walmart, P&G, Nestle and Apple, improved transparency through vendor-managed inventory or continuous replenishment programmes (CRP) to collate and distribute data in real time. More recently in the retail industry, IoT methods and Radio Frequency Identification (RFID) are used to provide more up-to-date, accurate information sharing.

Ongoing impact

While many of these strategies are prevalent in business today, larger order quantities, increasing cycle times, poorly planned promotions and poorly executed software changes still cause the bullwhip to snap.

What the bullwhip papers show is that the effect has to be tackled strategically. To this end the papers’ insights are continuing to influence the development of emerging information systems, enterprise resource planning (ERP), IoT, and the blockchain movement. From a management perspective, supply chain managers continue to use the bullwhip concept to explain to decision-makers why they should invest in information gathering in the supply chain and the significant costs that can occur if this information is distorted or ignored.